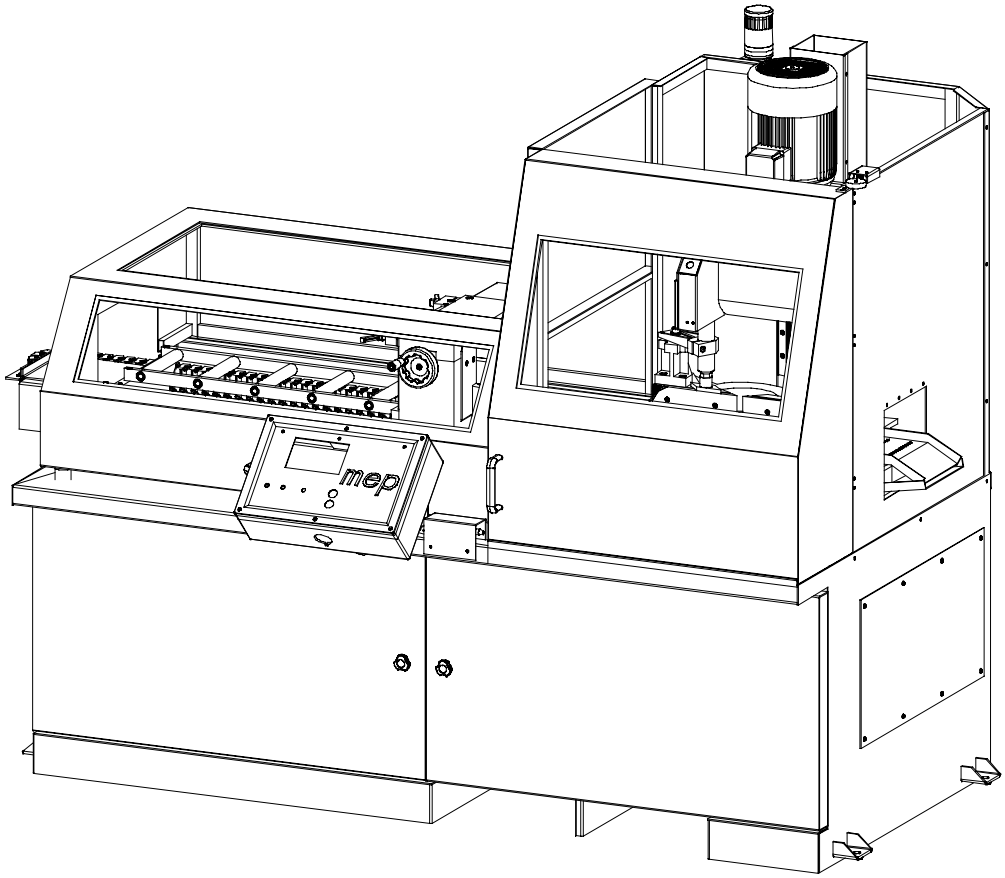

USE AND MAINTENANCE MANUAL

EN TIGER 370 CNC-MR

YEAR OF MANUFACTURE: _____

EN

"CE" CONFORMITY DECLARATION
(according to EEC MACHINES DIRECTIVE 2006/42/CE annex II A)

The manufacturer:

MEP® SPA

SEGATRICI
Via Enzo Magnani, 1
61045 Pergola (PU) ITALIA
Tel. 072173721-Fax 0721734533

Hereby declares that the circular sawing machine:

Machine model:	**TIGER CNC-**
Serial number:	
Year of manufacture:	

is in specification with the following directives

- **DIRECTIVE EEC MACHINES DIRECTIVE 2006/42/CE**
- **DIRECTIVE 2006/95/CE "LVD"**
- **DIRECTIVE 2004/CE "EMC"**
- **D. Lgs. 17/2010**

Responsible of a Technical File
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61045 - Pergola - PU - ITALY

Managing Director
(William Giacometti)

Pergola, lì _____

FAC SIMILE

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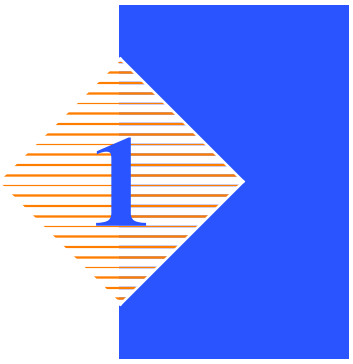
Introduction and technical specifications



Foreword

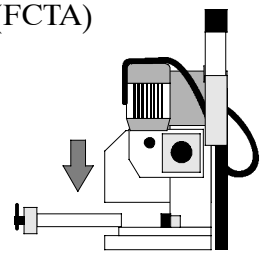
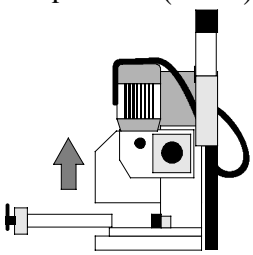
We have decades of experience in the construction of the best metal–cutting machines. Our experience, our knowledge of our customers and constant technological development of design and production equipment allow us to offer a specific solution for every type of cutting need. This work tool has been designed as a simple and reliable answer to the wide range of cutting needs of the modern workshop. **TIGER 370 CNC–MR** is rugged, quiet and safe. It cuts various kinds of material, with very little scrap and great applicative flexibility for cutting copper, brass and bronze.

Congratulations for having chosen this product which, by following the instructions contained in this user and maintenance handbook, will guarantee you years of dependable service.

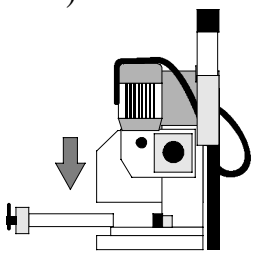
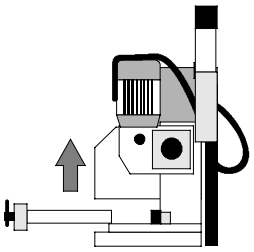
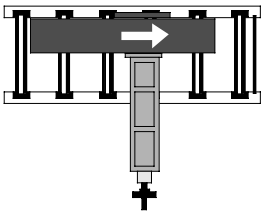
Warning This band saw has been exclusively designed to cut metals.

Machine presentation

TIGER 370 CNC–MR is an electromechanical pneumatic saw, which cuts metal profiles and solids. It can operate in SEMIAUTOMATIC or AUTOMATIC mode. In Semiautomatic mode, after setting the cutting head stroke and the head downstroke speed on the control panel, position the vice 2÷3 mm from the material being processed and press the start button on the control panel to activate the disk (or foot pedal if supplied);

1. The cutter vice closes	2. The head lowers until the cut is made (FCTA)	3. The head returns to start position (FCTI)	4. The cutter vice opens
			

In Automatic mode, after setting the cutting head stroke and the head downstroke speed on the control panel, position the vice 2÷3 mm from the material being processed and press the start button on the control panel to activate the disk (or foot pedal if supplied):

1. The cutter vice closes	2. The head lowers until the cut is made (FCTA) 	3. The head returns to start position (FCTI) 	4. The feed vice closes
5. The cutter vice opens	6. The cutting material is fed 	7. The cutting vice closes	8. The feed vice opens and the cutting cycle starts up

Machine specification

The anodised aluminium name plate is riveted on the side of the machine; the same data are reproduced on the declaration of conformity included with this use and maintenance manual.

N.B. When communicating with the Technical Service department, the model, serial number and year of manufacture of the machine must be quoted.

Technical Data

WORKING PRESSURE		
Max. working pressure for opening/closing vice	Bar	6
Air consumption for a complete cycle	Nl/min	5,74

N.B. The “air consumption” value refers to standard conditions (temperature 0° and pressure 1.013 bar, i.e. density 1.3 x 10^{-3} Kg/l) where 1 Kg/min. = 772 Nl/min.

LUBRICANT/COOLANT FLUID AND OIL		
Lubricant/coolant fluid (oil concentration 5–6%)	capacità Lt.	105
Oil for transmission box	capacità Lt.	10

VICE		
Vice max. opening	mm	190

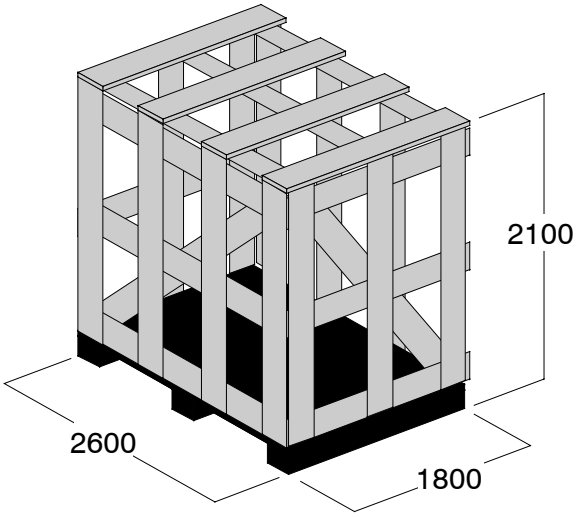
CUTTING CAPABILITY

Model	Blade diameter	●	■	▬	▮
0°	370	120	100	180 x 100	
45° ◗	370	70	70		70 x 100
45° ◖	370	70	70		70 x 100
60° ◖	370	50	50		50 x 100

CUTTING CAPABILITY

Model	Blade diameter	○	□	▭	▯
0°	370	120	100	180 x 100	
45° ◗	370	115	100	120 x 100	
45° ◖	370	115	100	120 x 100	
60° ◖	370	115	90		90 x 100

PACKED WEIGHT		
Wooden cage and pallet	Kg	250
Wooden pallet	Kg	100



Technical Data

CUTTING SPEEDS		
Speed	rpm	900
Speed (optional)	rpm	600÷900

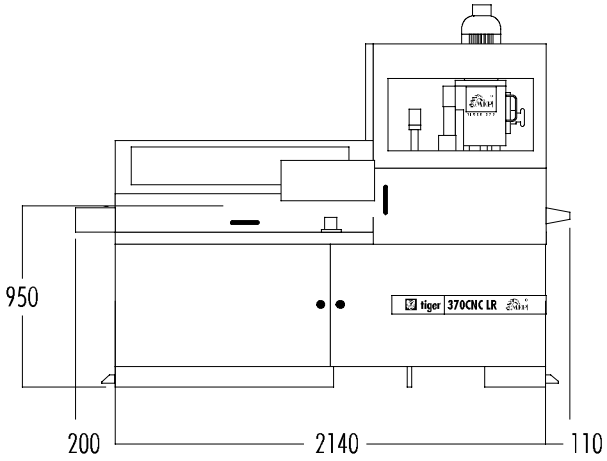
Disk blade (HSS type)		
External disc diameter	mm	370
Internal hole diameter	mm	32
Blade thickness	mm	3

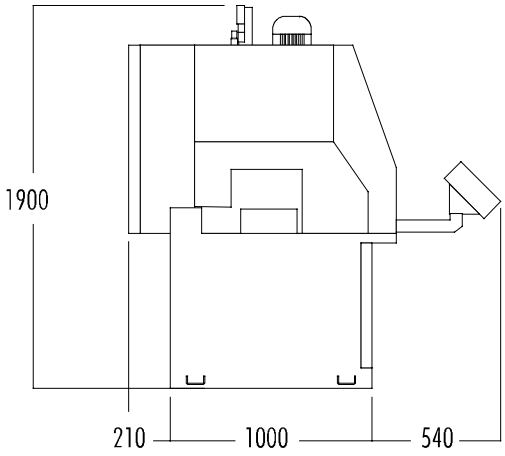
RATED ELECTRICAL POWER		
Head spindle motor	Kw	3
Electric coolant pump motor	Kw	0,09 x 2
Feed step motor	Kw	0,44
Step head motor	kW	0,048
Max installed power	kW	3.668

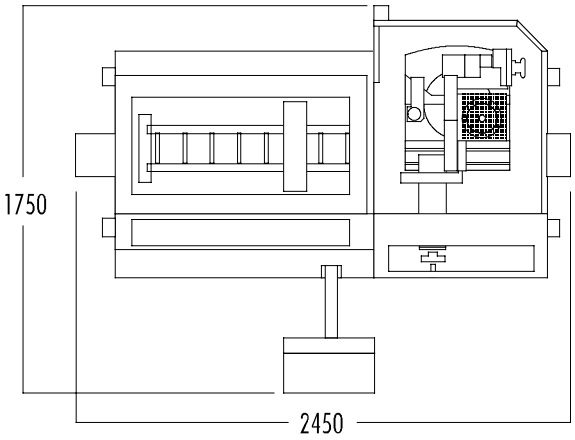
SPINDLE MOTOR				
No.of poles	**Current (Volts)**	**Absorption (Amps)**	**Power (Kw)**	**rpm**
6	380	8,4	3	940–1130
Stator wound with enamelled copper wire, class H 200° C.				
Class F insulation (limit temperature TL 155° C).				
IP 54 protection rating (total against contact with live parts, water sprayed from all directions, with shaft oil seal).				
Conforming to CEI norms, publication: IEC 34 of 01/07/1985.				

Dimensions

MACHINE INSTALLED		
Work table height	mm	1000
Weight	Kg	1060


950
tiger 370CNC LR
200
2140
110


1900
210
1000
540

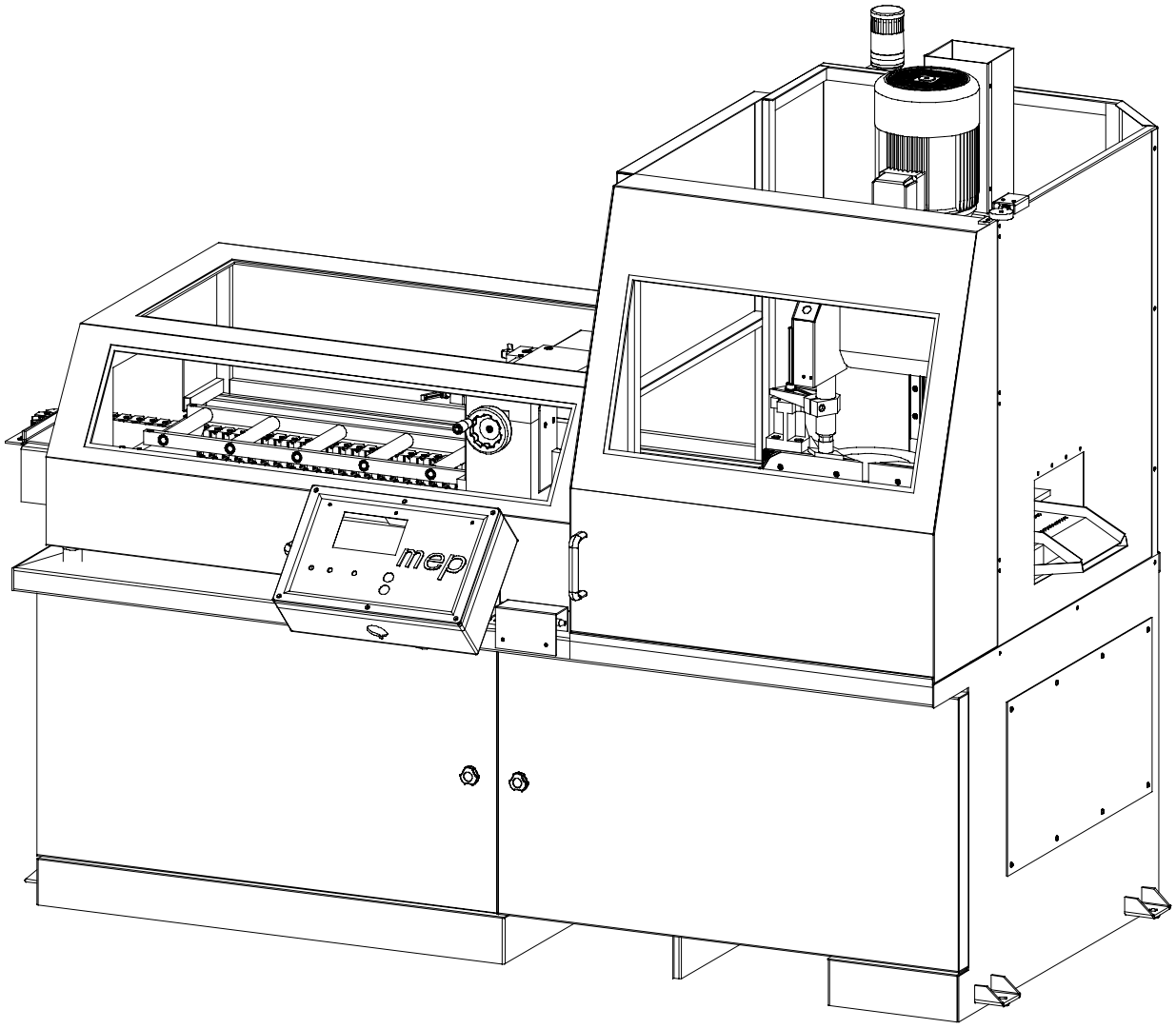

1750
2450

Functional parts

2

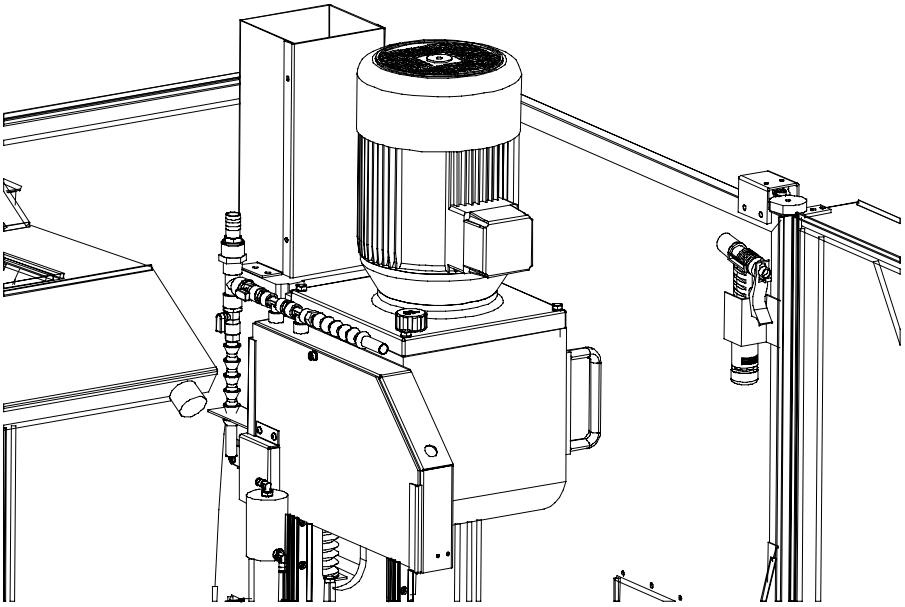
TIGER 370 CNC-MR model

In order for the user to move towards a full understanding of how the machine works, which is described in detail in the chapter 5, this chapter deals with the main units and their locations.



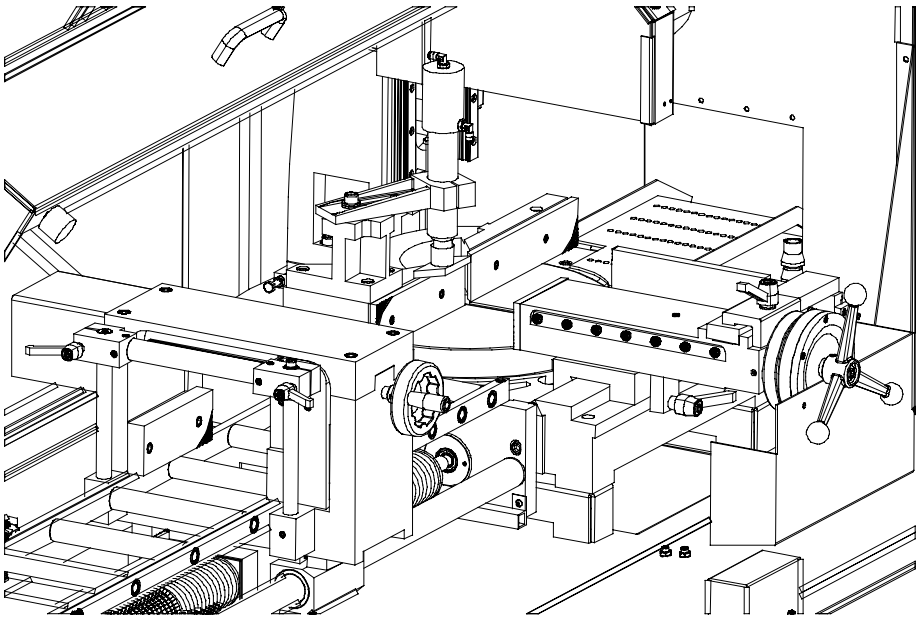
Cutting head

The cutter head makes the cut. It is contained inside guards preventing accidental contact with the tool and moving parts. It is moved by an electro–mechanical cylinder (step motor), and runs on a twin linear guide with ball–bushing sliding blocks. This system makes the structure highly rigid, providing a better cutting finish with less vibration and noise.



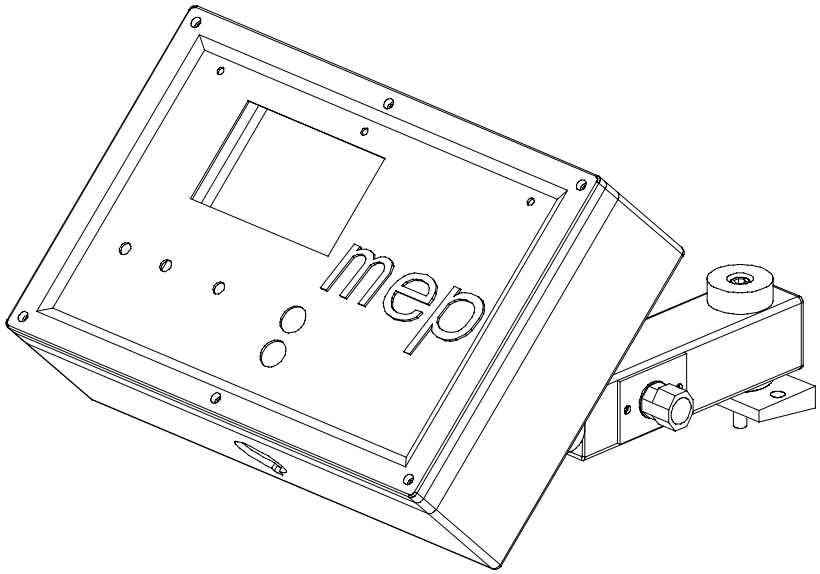
Cutting vice

The vice is the unit that clamps the workpiece during cutting; it consists of a vice support, commonly known as a “lead nut” fixed to the work table on which a mobile jaw is mounted. The vice is operated manually by a handwheel and locked by a Pneumatic cylinder.



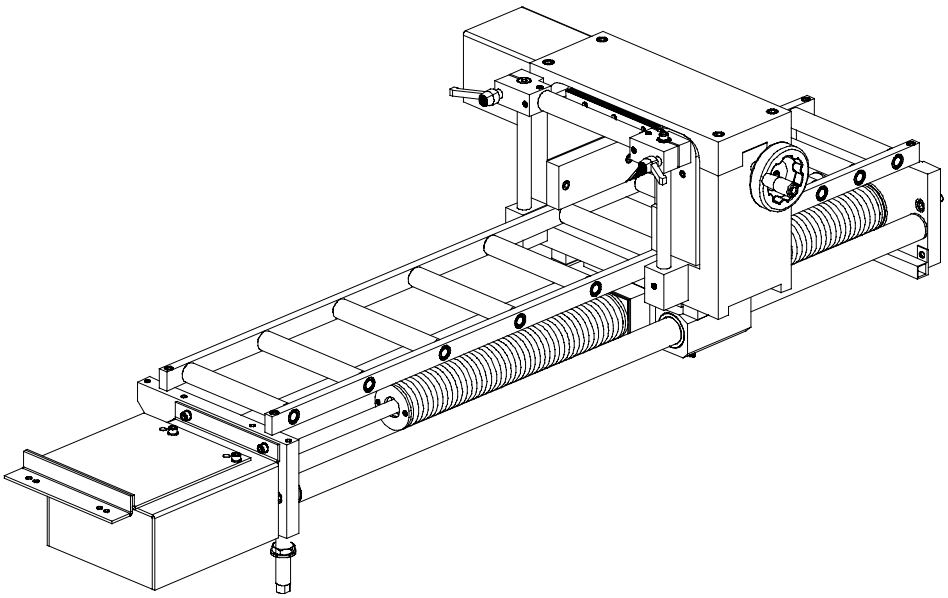
Control Panel

The control panel has a protection rating of IP 54 and contains the electronic equipment. Access to the control panel is protected by a safety panel mounted on hinges and fastened with screws, specially designed to prevent tampering. The control panel swivels on two articulated joints so that it can be positioned by the operator for greater ease−of−use and safety.



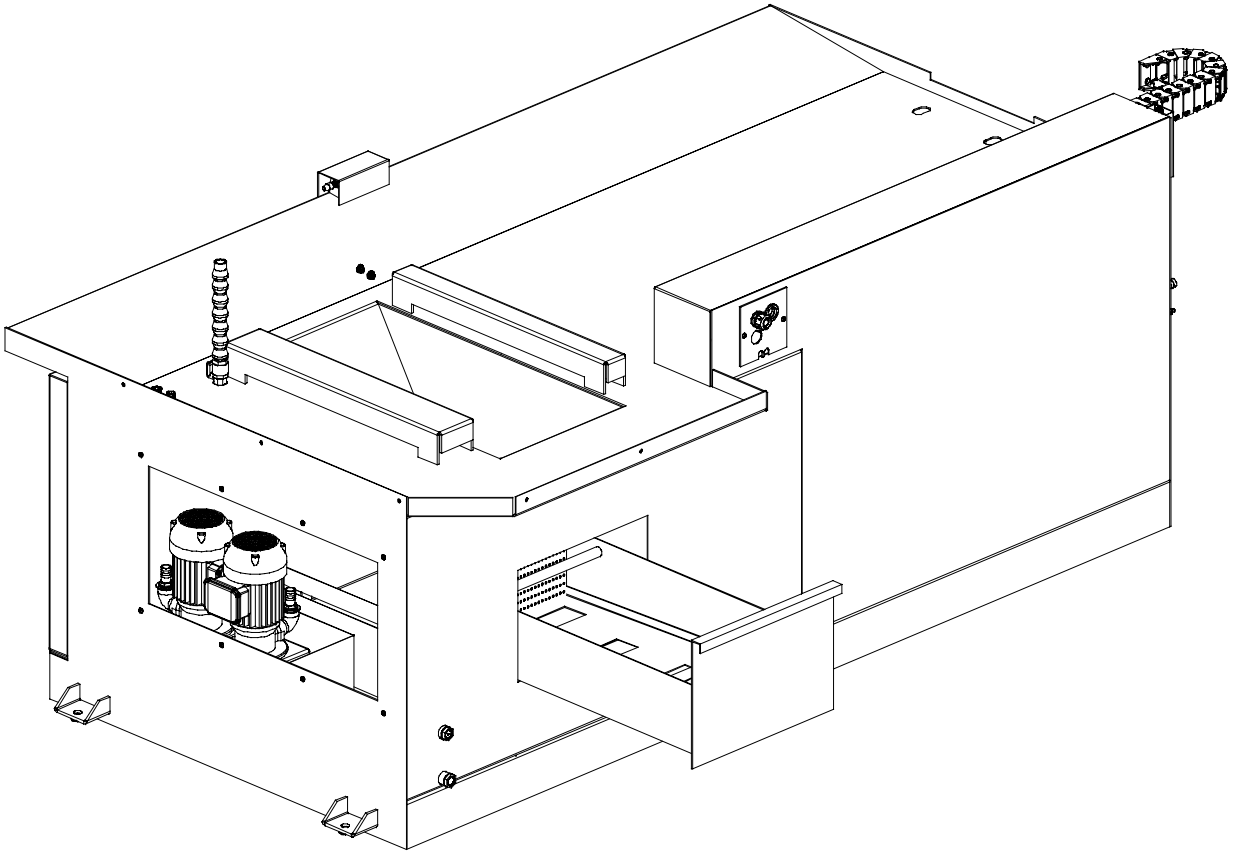
Feeder

The material, locked by means of the pneumatic vice, is delivered by a carriage which conveys it along ground guides. The numeric check controls, with great precision, the step motor of the infeed carriage, enabling the operator to set, on the same bar, 32 batches of pieces to be cut, each with different amounts and lengths.The material, locked by means of the pneumatic vice, is delivered by a carriage which conveys it along ground guides. The numeric check controls, with great precision, the step motor of the infeed carriage, enabling the operator to set, on the same bar, 32 batches of pieces to be cut, each with different amounts and lengths.

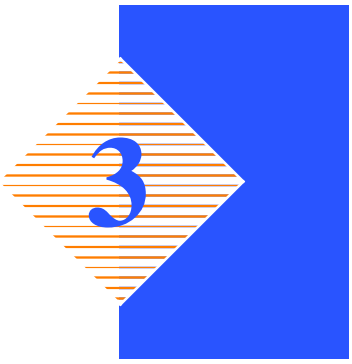


Base

This unit features a large coolant collection surface which conveys the coolant to the rear tank via the tank cover, and a swarf collection drawer. An electric pump is housed inside the tank which draws the clean fluid from the filter system.



Safety and accident prevention



The **TIGER 370 CNC–MR** has been designed and produced in accordance with European standards. For the correct use of the machine we recommend that the instructions contained in this chapter are carefully followed.

Use of the machine

The **TIGER 370 CNC–MR** circular saw is designed to cut exclusively non–ferrous profiles and solid metal sections. Other types of material and machining are not compatible with the specific characteristics of the saw. The employer is responsible for instructing the personnel who, in turn, are obliged to inform the operator of any accident risks, safety devices, noise emission and accident prevention regulations provided for by international standards and national laws regarding the use of the machine. The operator must be perfectly aware of the position and function of all the machine's controls.The instructions, warnings and accident prevention standards in this manual must be respected without question by all those concerned.The following definitions are those provided for by **EEC MACHINES DIRECTIVE 2006/42/CE** :

- "Danger zone": any zone in and/or around a machine in which the presence of a person constitutes a risk for the safety and health of that person.
- "Person exposed": any person finding himself either completely or partly in a danger zone.
- "Operator": the person or persons given the responsibility of installing, operating, adjusting, maintaining, cleaning, repairing or transporting the machine.

Attention The manufacturer declines any responsibility whatsoever, either civil or criminal, should there be unauthorised interference or replacement of one or more parts or assemblies on the machine, or if accessories, tools and consumable materials are used that are different from those recommended by the manufacturer itself or if the machine is employed in a plant system and its proper function is thereby altered.

General recommendations

LIGHTING

Insufficient lighting for the types of operation envisaged could constitute a safety hazard for the persons concerned. For this reason, the machine user must provide lighting in the working area sufficient to eliminate all shadowy areas while also avoiding any blinding light concentrations. (Reference standard ISO 8995–89 "Lighting in work environments").

CONNECTIONS

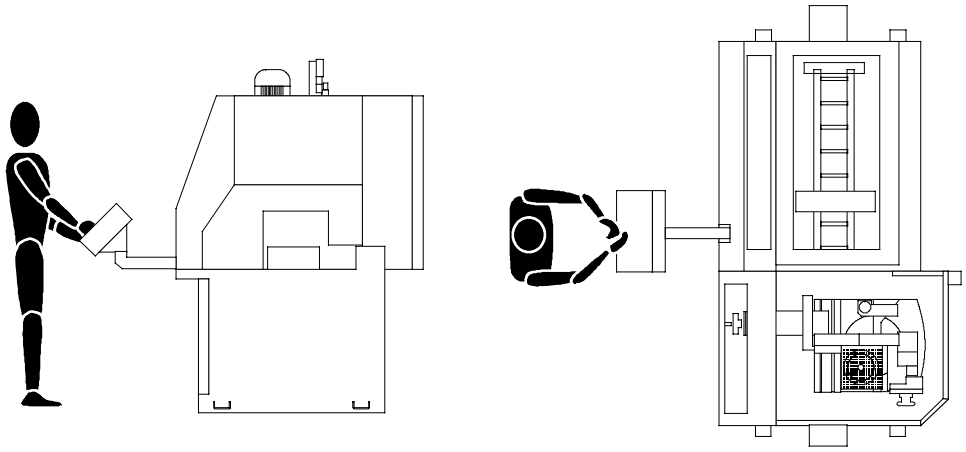
Check that the power supply cables and pneumatic feed systems comply with the maximum machine absorption values listed in the "Machine Specification" tables; replace if necessary.

EARTHING

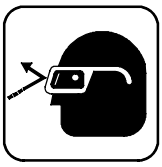
The installation of the earthing system must comply with the requirements set out in IEC STANDARD 204.

OPERATOR POSITION

The position of the operator controlling machine operations must be as shown in the diagram below.



Recommendations to the operator



Always wear proper goggles or protective glasses.

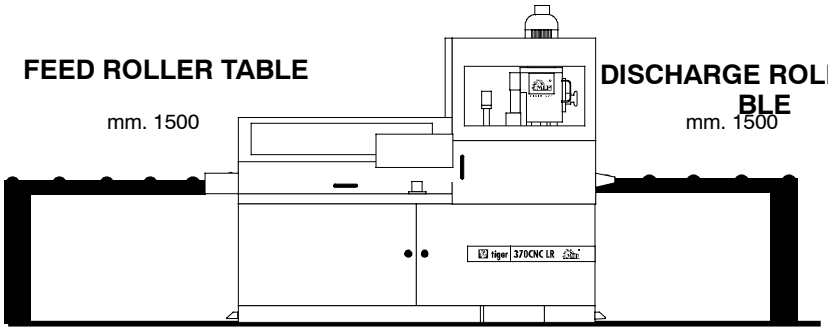
Do not use the machine without the guards in position. Replace the polycarbonate windows , if subject to corrosion.

Do not allow hands or arms to encroach on the cutting zone while the machine is in operation.

Do not wear oversize clothing with long sleeves, oversize gloves, bracelets, necklaces or any other object that may become entangled in the machine during working; long hair must be tied back and bunched.

Always disconnect the power supply to the machine before carrying out any maintenance work whatsoever, including in the case of abnormal operation of the machine.

Before starting cutting operations, support the material at both ends of the machine using the support arm – standard, or OPTIONAL accessories such as the feed and discharge roller tables shown in the diagram below.



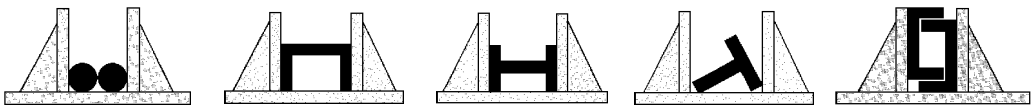
Any maintenance work on the hydraulic or pneumatic systems must be carried out only after the pressure in the system has been released.

The operator MUST NOT perform any risky operations or those not required for the machining in course (e.g. remove swarf or metal shavings form the machine while cutting).

Remove equipment, tools or any other objects from the cutting zone; always keep the working area as clean as possible.

Do not use the machine for cutting pieces which exceed the cutting capacity described in the technical specifications or are less than 5 mm

Before starting any cutting operations, ensure that the workpiece is securely held in the vice and the machine has been set correctly. A number of examples of how to clamp the different profiles correctly in our machines are shown below.



Never move the machine while it is cutting.

Do not use blades of different sizes to those recommended in the machine's specifications.

When cutting very short pieces, make sure that they are not dragged behind the support shoulder, where they could jam in the blade.

When using the pneumatic vice (version MA) check that the jaws actually move right up to and effectively block the piece, as the maximum travel in only 6 mm, and check that the clamping pressure is correct.

When working on the bandsaw, only wear gloves when handling materials and tool change or adjustment operations. Only carry out one operation at a time and do not hold more than one item or operate more than one device simultaneously. Keep hands as clean as possible.

Warning: if the blade jams in the cut, press the emergency stop pushbutton immediately. If this does not free the blade, slowly release the vice, remove the piece and check that the blade or its teeth for damage, if need be replace the blade.

Before carrying out any repair works on the machine, consult the MEP Technical Service; this can also be done through an agency in the country in which the machine is being used.

Machine safety devices

This use and maintenance manual is not intended as purely a guide for the use of the machine in a strictly productive environment, it is instead an instrument providing information on how to use the machine correctly and safely. The following standards are those specified by the EEC Committee in the directives regarding safety of machinery, health and safety at work, personal protection and safeguarding of the environment. These standards have been applied to the **TIGER 370 CNC–MR** band saw.

Reference standards

MACHINE SAFETY

- EEC MACHINES DIRECTIVE 2006/42/CE ;
- EEC directive no. 2004/108/CE “EMC - Electromagnetic Compatibility”;
- EEC Directive No. 2006/95/CE known as “Low voltage directive”.

HEALTH AND SAFETY AT WORK

- EEC Directive No. 80/1107; 83/477;86/188;88/188; 88/642 for the protection of workers against risks caused by exposure to physical, chemical and biological agents during working;
- EEC Directive No. 89/391 and Special EEC Directives No. 89/654 and No. 89/655 for improvements in health and safety at work;
- EEC Directive No. 90/394 for the protection of workers against risks deriving from exposure at work to carcinogenic substances;
- EEC Directive No. 77/576 and No. 79/640 on safety signs at work.

PERSONAL PROTECTION

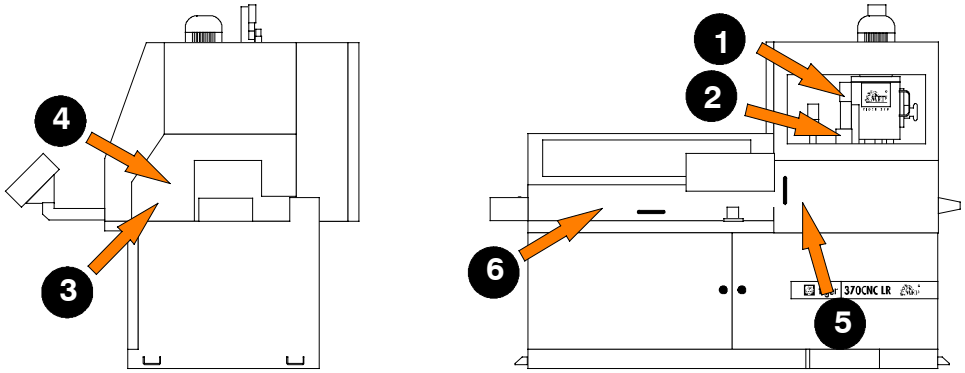
- EEC Directive No. 89/656 and No. 89/686 on the use of personal protection devices.

ENVIRONMENTAL PROTECTION

- EEC Directive No. 75/442 on waste disposal.
- EEC Directive No. 75/439 on the disposal of used oil.

Protection against accidental contact with the blade

1. Metal disc cover fixed to the cutting head;
2. mobile protection of the disc attached to the guard, in order to guarantee cover of the blade and to leave only the part of the disc used for cutting free as required by President's Decree 547/55 article 108;
3. vice with double–blocking anti–burr device to securely grip the workpiece;
4. the cutting and infeed vice is controlled by pneumatic devices, with maximum 6 mm stroke; the jaw which clamps the piece must be aligned to the part to be processed at a distance of 2÷3 mm;
5. Access to the cutting zone is bounded by a door fitted with a timed lock, which allows it to be opened only 5 or 10 seconds after the processing cycle has stopped;
6. the cutting material supply is protected by a sheet–metal casing, which can be opened, that is fitted with a Perspex window to check the cutting operations.



Electrical equipment

In accordance with Italian standard CEI 60204–1, April 1998, derived from European Standard EN 60204–1 publication IEC 204–1, 1997:

- 24 Vac Control voltage for actuators, in accordance with chapter 6 of European Standard "Control and indication circuits" paragraph 2 "Control Circuits" sub-section 1 "Preferential voltage values for control circuits";
- plant protected against short circuits by quick blowing fuses and earthing of all work and accidental contact parts;
- Protection from accidental start-up by a minimum voltage relay in the case of power failure.

Emergency devices

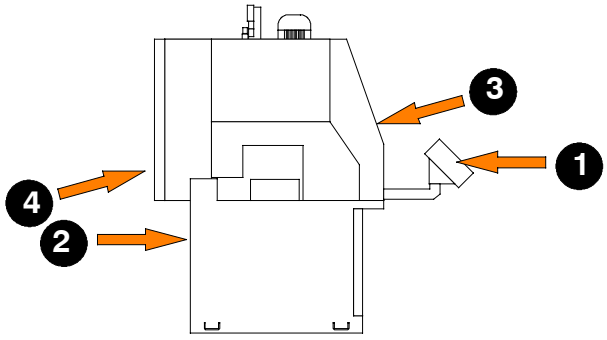
In accordance with Standard CEI 204–1:

- **Chapter 5 Section 6 Sub-section 1 "Emergency stop device"**: "the emergency stop device immediately stops all the dangerous and other functions of the machine".
- **Chapter 6 Section 2 Subsection 4 point 7 "Safety guards":** "the removal of safety guards protecting dangerous parts or zones of the machine causes the machine to shut down immediately. When the guards are returned to their original position the machine must be reset in order to resume work".

...Emergency devices applicable to the TIGER 370 CNC–MR:

1. **Emergency stop**: a non–return mushroom–head pushbutton, colour red on yellow background, is located on the control panel of the machine. To release the pushbutton, the actuator must be rotated 45°. After the emergency situation has been resolved, the machine must be reset.

2. **Thermal–magnetic circuit breaker**: this device incorporates two power failure protection systems. In fact, in the event of a power failure, it disconnects all the electrical components, causing the machine to shut down immediately and prevents it from automatically starting up again when power is restored. The device also resets the thermal relay fitted to protect against current overloads.
3. **Head casing safety switch**: to access the cutting zone it is necessary to open the front door, pressing the relevant button on the control console. This device cannot be removed and has timed opening; therefore, it can only be opened 5 or 10 seconds after the processing cycle has stopped.
4. **Feeder casing safety switch**: to access the cutting material feeder, it is necessary to open the casing, with a safety limit switch that stops all machine operations that must be reset to continue processing.



Noise level of the machine

Noise can cause hearing damage and represents one the problems faced by many countries who adopt their own standards. In accordance with the **EEC MACHINES DIRECTIVE 2006/42/CE** , we are listing the standards that specify noise levels for machine tools. This chapter also reports the noise levels produced by the **TIGER 370 CNC–MR** during its various operating phases and the methods used for measuring these levels. The Italian standard governing this aspect is D.M.n.277/91 drawn from EEC Directives 80/1107, 82/605, 83/477, 86/188, 88/642, UNI EN ISO 4871 (1998).

Noise level measurement

Noise levels are measured using an instrument known as an Integrator noise–meter which registers the equivalent continuous acoustic pressure level at the work station. The damage caused by noise depends on three parameters: level, frequency and duration. The equivalent level concept Leq combines the three parameters and supplies just one indication. The Leq is based on the principle of equal energy, and represents the continuous stationary level containing the same amount of energy, expressed in dBA, as that actually fluctuating over the same period of time. This calculation is made automatically by the integrator noise–meter. The measurements are taken every 60 seconds, in order to obtain a stabilised value. The reading stays on the display for a sufficient time to enable a reading to be taken by the operator.Measurements are taken by holding the instrument at approximately 1 metre from the machine at a height of 1.60 metres above the platform at the operator's work station. Two measurements are taken: the first while the machine operates without cutting anything, the second while cutting in manual mode.

Noise level values

Identification		
Machine type		Circular sawing machine
Model		**TIGER 370 CNC–MR**
Reference standard		ISO 3746

Results		
Test 1st	**Results**	**Mean sound level (Leq) 67,7 dB (A)** Environmental correction (K) 0,6 dB(A) Peak sound power (Lw) 85,0 dB(A)
Test 2nd	**Results**	**Mean sound level (Leq) 65,2 dB(A)** Environmental correction (K) 0,6 dB(A) Peak sound power (Lw) 82,6 dB(A)
Test 3rd	**Results**	**Mean sound level (Leq) 68,8 dB(A)** Environmental correction (K) 0,6 dB(A) Peak sound power (Lw) 86,2 dB(A)

Vibration emission

This sawing machine complies with the norms EN1299 and EN1033, as the machine vibration emission on the devices controlled by the operator does not exceed the threshold of 2.5 m/s^2

Electromagnetic compatibility

As from 1 January 1996 all electrical and electronic appliances bearing the CE marking that are sold on the European market must conform to Directive 2004/108/CE e 2006/95/CE and 2006/42/CEE. The prescriptions regard two specific aspects in particular:

1. “EMISSIONS: during its operation, the appliance or system must not emit spurious electromagnetic signals of such magnitude as to contaminate the surrounding electromagnetic environment beyond clearly prescribed limits”;
2. “IMMUNITY: the appliance or system must be able to operate correctly even when it is placed in an electromagnetic environment that is contaminated by disturbances of defined magnitude”.

The following text contains a list of the applied standards and the results of the electromagnetic compatibility testing of machine model **TIGER 370 CNC–MR**; Test report no. 120101.

Emissions

- CEI EN 61000-6-4 (2002) Electromagnetic Compatibility (EMC) - Generic standard regarding emissions. Part 6-4: Industrial Environment.
- EN 55011 (1999) Industrial, scientific, and medical radio frequency appliances (ISM). Characteristics of radio frequency disturbance - Limits and methods of measurement.
- EN 55014-1 (2002) Electromagnetic Compatibility - Prescriptions for domestic appliances, electric power tools, and similar equipment. Part 1: Standard Emission in relation to product family.

CONDUCTED EMISSIONS				
Gate A	**Freq. (MHz)**	**Q–peak limit (dBuV)**	**Mean value limit (dBuV)**	**Result**
A.C. power supply input	0.15 – 0.5 0.5 – 5 5 – 30	79 – 73 (linear reduction with log of frequency) 73 73	66 – 60 (linear reduction with log of frequency) 60 60	Complies

CONDUCTED EMISSIONS – ANALYSIS OF INTERMITTENT DISTURBANCES	
Gate	**Result**
A.C. power supply input	Not applicable

IRRADIATED EMISSIONS			
Gate	**Freq. (MHz)**	**Q–peak limit (10 m) (dBuV/m)**	**Result**
Enclosure	30 – 230 230 – 1000	40 47	Complies

Immunity

- CEI EN 61000-6-2 (2000) Electromagnetic Compatibility (EMC) - Generic standard on immunity. Part 6-2: Industrial Environment.
- EN 61000-4-2 + A1 (1996-1999) Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 2: Electrostatic discharge immunity tests - Basic publication.
- EN 61000-4-3 Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 3: Radiated, radio- frequency, electromagnetic field immunity test.
- EN 61000-4-4 (1996) Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 4: Fast transients/bursts immunity tests - Basic publication.
- EN 61000-4-5 (1997) Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 5: Surge immunity test.
- EN 61000-4-6 (1995) Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 6: Immunity to conducted interference, induced by radio frequency fields.
- EN 61000-4-11 (1977) Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 11: Voltage dips, short interruptions and voltage variations immunity tests.

IMMUNITY TO ELECTROSTATIC DISCHARGES			
Gate	**Test levels**	**Evaluation criterion**	**Result**
Enclosure	contact 4 kV steel plate 4 kV in air 8 kV	B	Complies

IMMUNITY TO VOLTAGE (BURSTS)			
Gate	**Test levels**	**Evaluation criterion**	**Result**
A.C. power supply input	2 kV	B	Complies

IMMUNITY TO CONDUCTED ELECTROMAGNETIC FIELDS			
Gate	**Test levels**	**Evaluation criterion**	**Result**
A.C. power supply input	10V	A	Complies

IMMUNITY TO IRRADIATED ELECTROMAGNETIC FIELDS			
Gate	**Test levels**	**Evaluation criterion**	**Result**
Enclosure	10 V/m	A	Complies

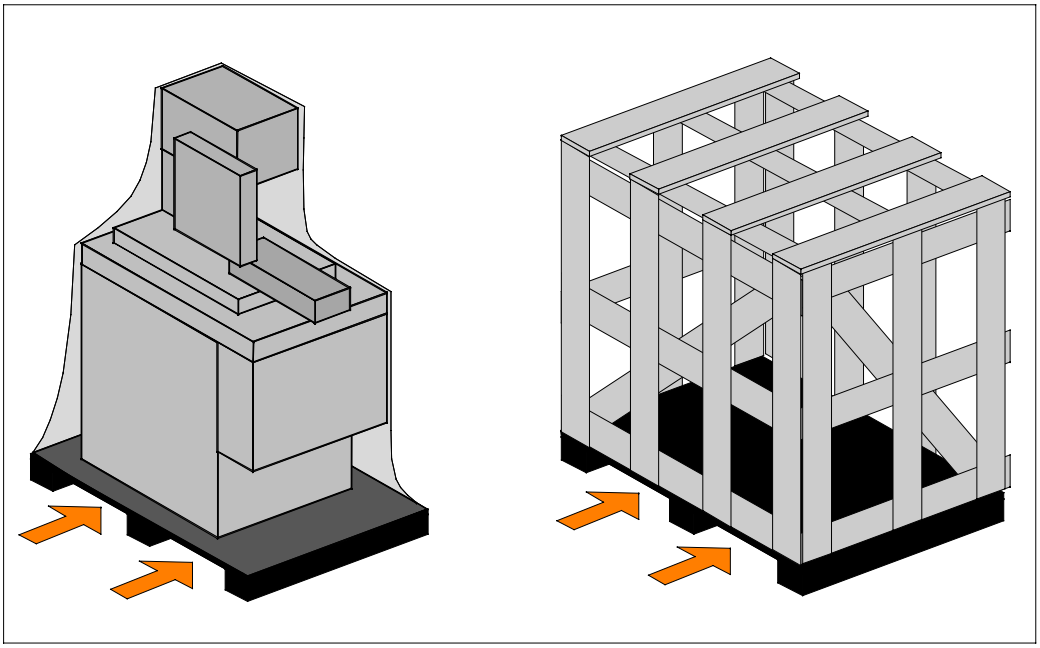
Machine installation

4

Packaging and storage

MEP S.p.A. use packing materials that guarantee the integrity and protection of the machine during its transport to the customer.

The type of packing differs according to the size, weight and destination. Therefore the customer will receive the machine in one of two following ways:

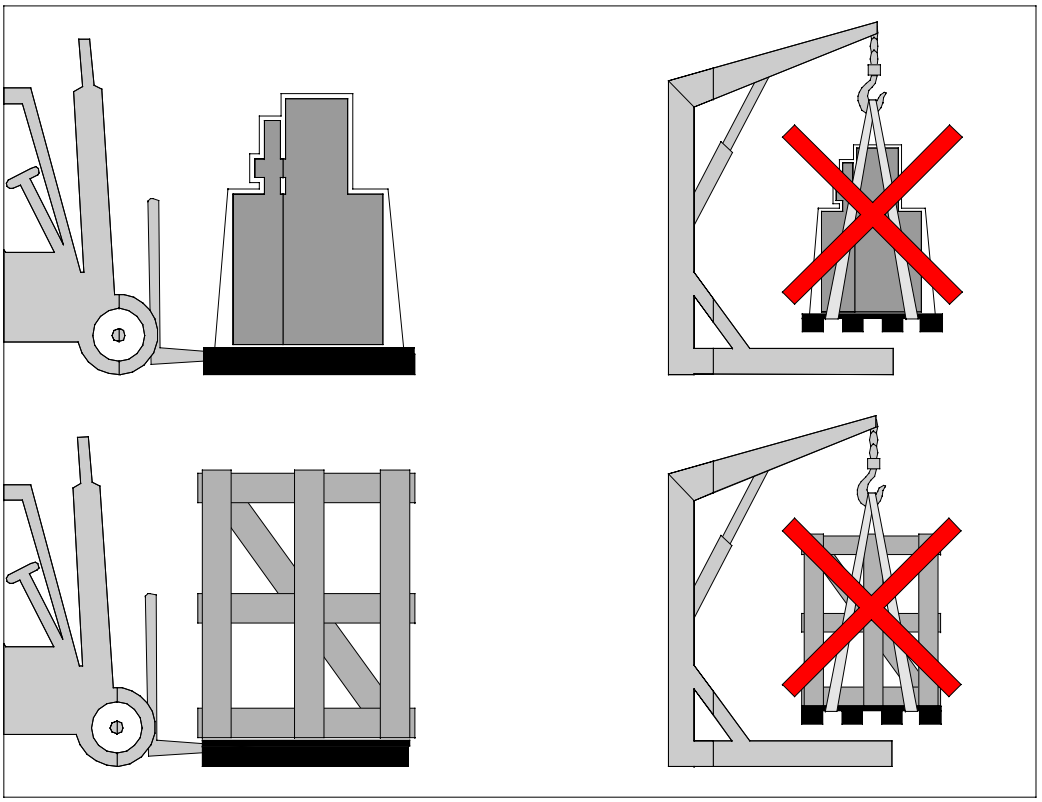


1. on a pallet with straps and heat–shrink plastic;
2. on a pallet with straps, heat–shrink plastic and a wooden crate.

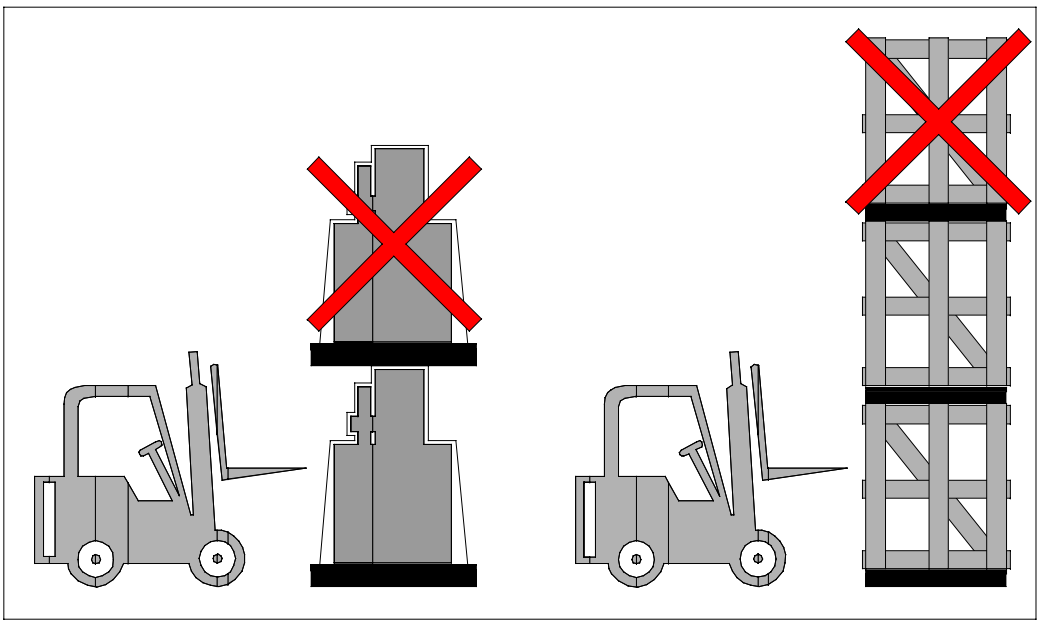
Warning In both cases, for correct balancing the machine must be handled using a fork–lift truck, inserting the tines at the points indicated by the arrows, using the reference marks on the crate itself.

Attention Before carrying out lifting operations, make sure that the weight of the machine, as indicated on the crating or other packaging, is within the forklift truck load limit.

Attention Do not handle the packed machine using slings.

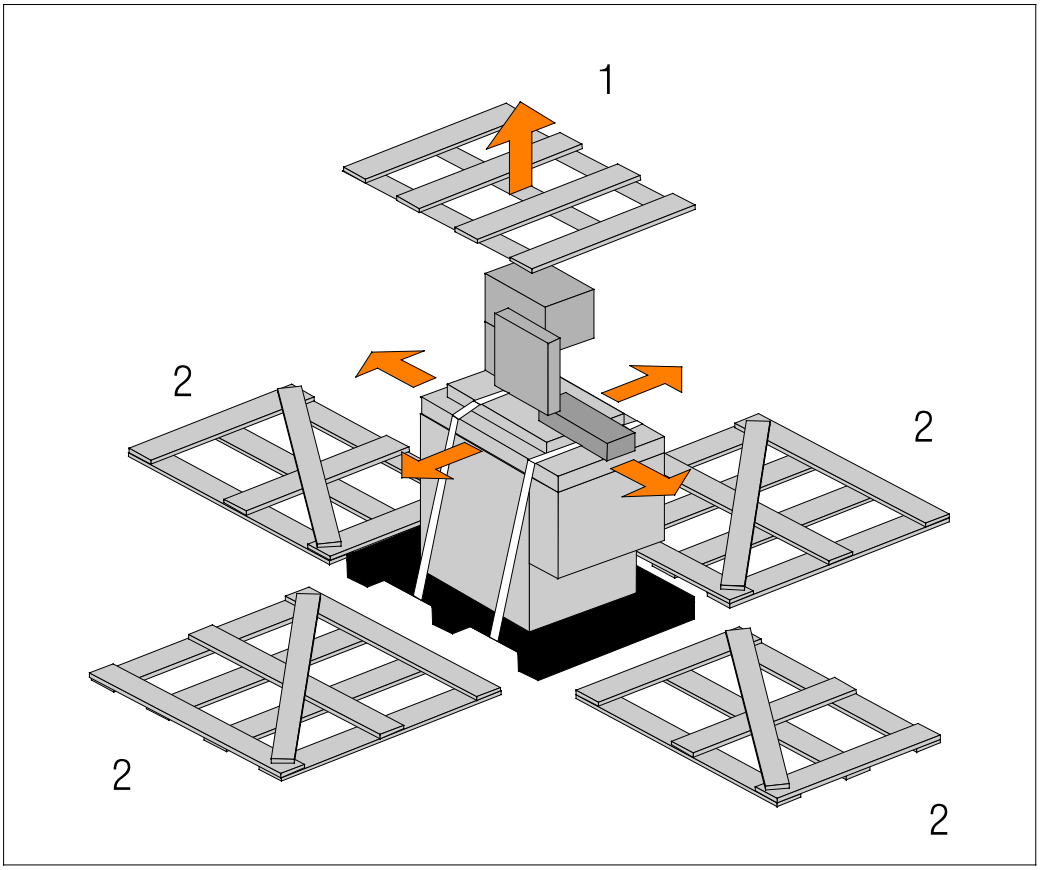


Attention When storing, machines palletized and shrink-wrapped must not be stacked two high, and machines pallettized and crated must not be stacked three high.

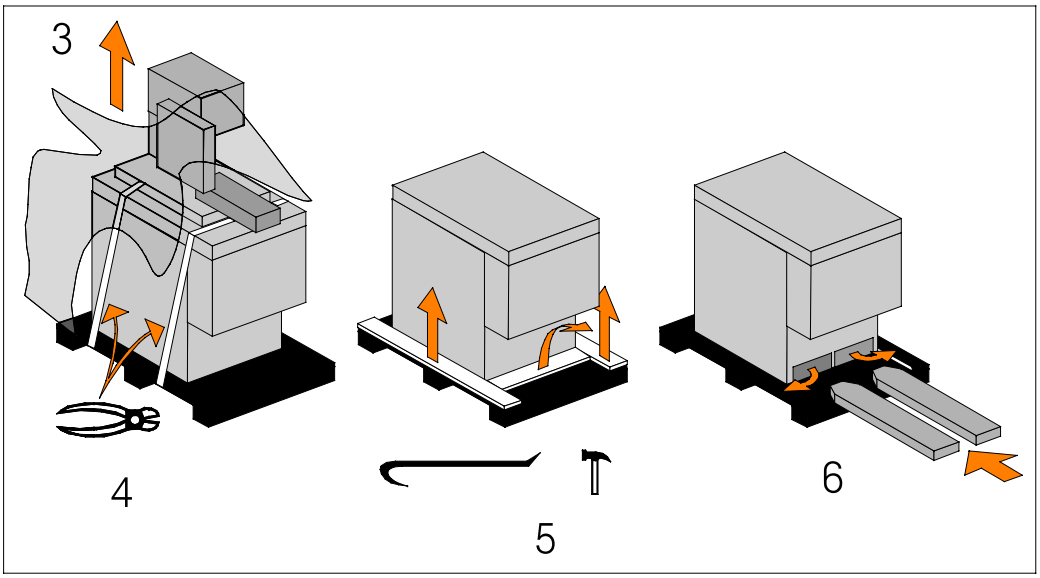


To install the machine, first remove the packing, paying particular attention not to cut any electric wires or hydraulic hoses; if necessary use pliers, a hammer and a cutter.
Open crate in the illustrated order:

1. remove nails and lift the top of the cage;
2. remove nails and lower walls;



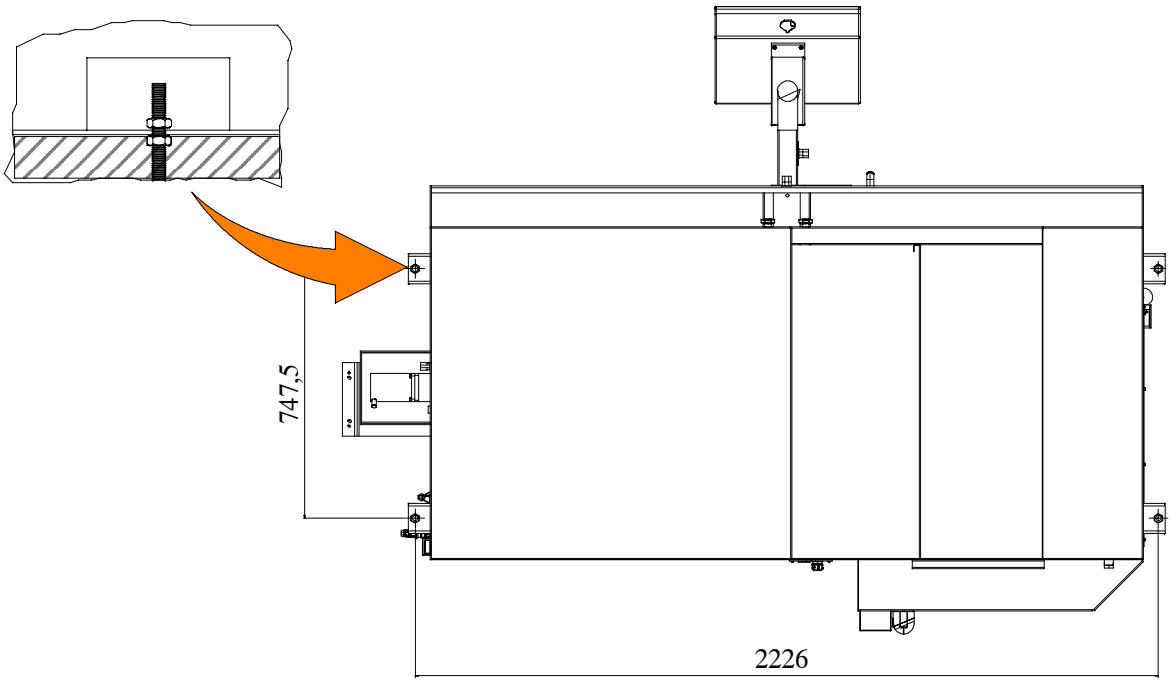
3. remove heat−shrink covering;
4. remove the straps;
5. remove nails from pallet securing planks and remove planks;
6. remove the front panel and insert fork tines.



To locate the machine in the workplace, **the machine dimensions** and necessary operator working space, including **the spaces laid** down in safety standards, **must be taken into account.**

Anchoring the machine

The base of the machine is anchored to the floor by two permanent studs located on the sides of the base. The studs are screwed into nuts previously sunk into the concrete, and tightened from above with lock nuts. The schematic specifications set out in Chapter 1 should be taken into account when positioning the machine.



Minimum requirements

For the machine to function correctly, the room in which it is to be installed must satisfy the following requirements:

- power supply voltage/frequency: refer to the values on the rating plate;
- working pressure not less than 6 Bar and not greater than 8 Bar;
- temperature of machine location: from -10 to +50° C;
- relative humidity: not more than 90%;
- lighting: not less than 500 Lux.

Warning The machine is already protected against voltage variations, but will only run trouble-free if the variations do not exceed ± 10%.

Check list

Before starting installation, check that all the accessories, whether standard or optional, supplied with the machine are present. The basic version of the **TIGER 370 CNC–MR** is supplied complete with:

CHARACTERISTICS		
Multi–microprocessor with two controlled axes that permits programming 32 batches of workpieces with different lengths and quantities on the same bar	✓	
Three–stage drive system to ensure a high level of rigidity and precision, and to attain a great capacity for removal	✓	

CHARACTERISTICS		
Fully encased model to provide operator safety, sound insulation and the possibility of working with large quantities of liquid	✓	
HSS disk ø 370 x 32 x 3 for steel	✓	
HM disk ø 400 x 32 x 3.6 for aluminium and light alloys		✓
Cabinet for electric and electronic equipment with fully identifiable wiring, door–locking switch with padlockable device, emergency device, motor overload cut–out, minimum voltage coil and protection against a missing phase	✓	
Activation and control systems protected by input and output electric and electronic devices	✓	
Low tension control panel: softkey polyester keypad with thermo–moulded touch sensitive buttons and acoustic signal when the machine is started	✓	
48 character x 16 line display showing technical parameters such as: number of cuts programmed and executed, blade thickness, single forward movement measure, cutting time, ammeter, display of diagnostic messages (approx. 80) and warnings in the language chosen	✓	
Four controls to program the cutting head stroke limits, according to the dimensions of the bars to be cut	✓	
Programming and control console with LCD display comprehensive of self–diagnosis messages	✓	
Blade rotation with motor at a speed, together with an electronic variable speed drive, making cutting possible from 15 to 150 rpm to always accomplish the best efficiency	✓	
Spray gun to wash the work surfaces	✓	
Pneumatic clamp with adjustable steel gib	✓	
Acoustic and flashing light signal in case of machine stop	✓	
Infeed unit with step motor; screw/nut with ball bushing (length 1000 mm)	✓	
Vice with rag prevention device and double workpiece clamping feature	✓	
Swing feeder vice to deliver even deformed bars	✓	
Coolant tank obtained in the pedestal with a pair of motor pumps for a total delivery of 120 l/min	✓	
Chip drawer	✓	
Electric pump to lubricate and cool the disk	✓	
Blade cleaning brush	✓	
Upright pneumatic vice for cutting more than one bar	✓	
Cutting head moving on twin linear guide with pre–loaded double ball–bushing sliding blocks	✓	
Head movement with electro–mechanical cylinder to provide the greatest cutting rigidity	✓	
Rotating pin with pre–loaded thrust bearing to ensure precision and reliability	✓	
Machine set for handling with pallet truck	✓	
Keys, user manual and manual for ordering spare parts in the language used	✓	
Motor chip discharger		✓
Roller platform adapter on loading and unloading side		✓
Emulsifiable oil 5 l		✓
MEP slide bar loader for high production (CB6001)*		✓

*ACCESSORIES AVAILABLE ON REQUEST

Accessory kit is placed before the packaging inside the machine; it contains the following items:

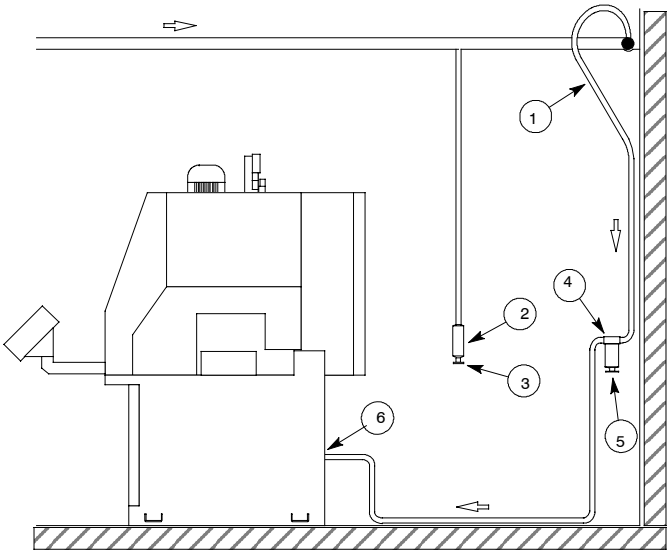
- 3, 4, 5, 6, 8 and 10 mm Allen keys;
- open 19 mm wrench;

- this Use and Maintenance Manual.

Connection to the compressed air supply

To ensure perfect operation and a long service life, it is recommended that the machine is connected to a compressed air system having the characteristics reported in the diagram below.

KEY
1 - DOWN PIPE
2 - CONDENSATE COLLECTOR
3 - DRAIN COCK
4 - AIR FILTER
5 - DRAIN COCK
6 - CONNECTING HOSE

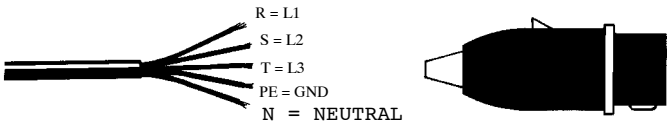


Connection to the power supply

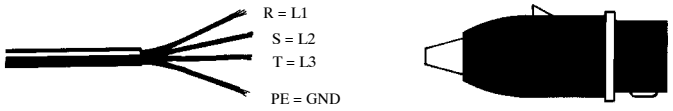
Before connecting the machine to the power supply, check that the socket is not connected in series with other machines. This requirement is fundamental for the good operation of the machine.To connect the machine to the power supply, proceed as follows:

▶ connect the power supply cable of the machine to a plug which matches the socket to be used. (EN 60204–1; par. 5.3.2).

CONNECTION FOR **"5-CORE"** WIRE SYSTEMS WITH NEUTRAL

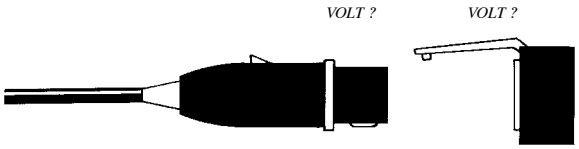


CONNECTION FOR **"4-CORE"** WIRE SYSTEMS WITH NEUTRAL

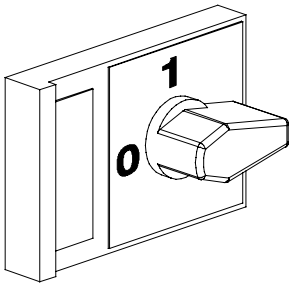


Attention When using systems with a neutral wire, special care must be taken when connecting the **blue** neutral wire, in that if it is connected to a phase wire it will discharge the **phase voltage** to the equipment connected for **voltage: phase-neutral.**

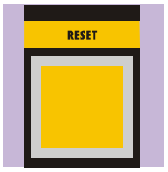
- Insert the plug in the socket, ensuring that the mains voltage is the same as that for which the machine has been setup.



- To switch on the machine, turn the main switch located at the rear, on the right–hand side of the electric cabinet;



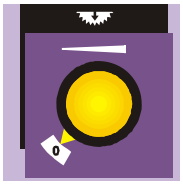
- press the ON button on the control console;
- press RESET twice.



The above sequence (ON and RESET buttons) must be performed each time the machine is switched on.

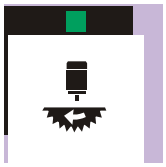
Make sure that the disk rotates properly. To do this, proceed as follows:

- make sure the machine is not in emergency status (red mushroom head button released); otherwise, release the emergency stop button and press RESET;
- set the cutting head downstroke adjuster by means of the specific selector;

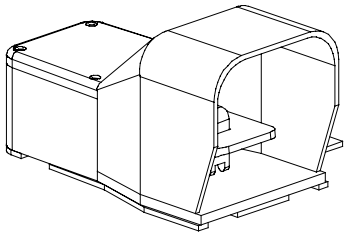


- set the speed of the disc by means of the relevant potentiometer;

▶ enable motor rotation by activating the blade motor selector on the control console;

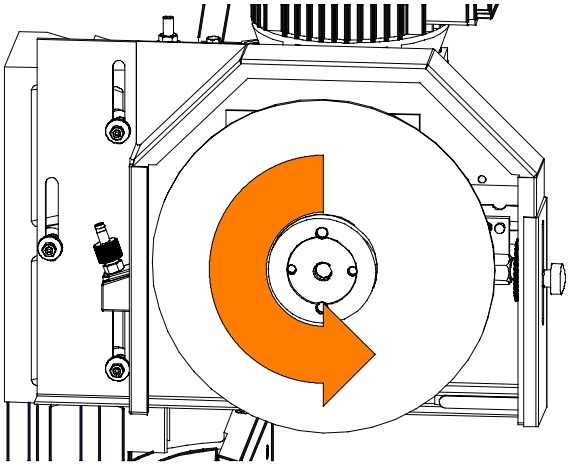


▶ start disc rotation using the start pushbutton on the control panel or the pedal control (if machine is equipped);



▶ if all the above operations have been carried out correctly, the disc motor will start up and the disc will start to turn.

Attention **Ensure that the blade moves in the correct direction as shown in the above figure.** If it does not, simply reverse two of the phase wires on the machine's power supply input.



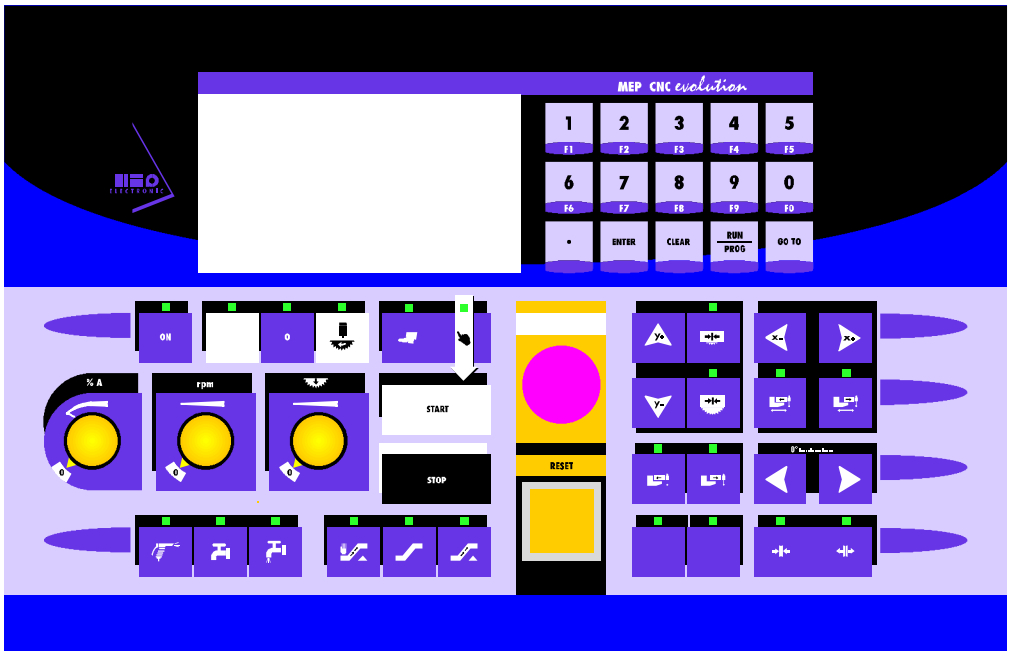
The sawing machine is now ready to start the work for which it was designed. Chapter 5 provides a detailed description of the various functions of the machine and its operating cycles.

Description of machine operation

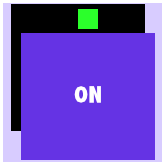
This chapter analyses all the machine functions. We begin with a description of the pushbuttons and other components on the control panel.

Description of the control panel

The control console is housed inside the control panel in an IP 54 rated housing which is tamperproof and resistant to dust and moisture. The control panel swivels on two articulated joints so that it can be positioned by the operator for greater ease of use and safety. The figure below shows the control panel of **TIGER 370 CNC–MR**:

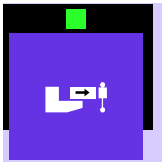


Key for control console keyboard

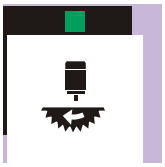


On key: enables machine operation

Cutting vice closure

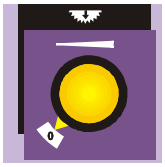


Cutting vice opening



Blade motor selector: during normal operation of the machine, this enables or disables the cutting cycle start button (START)

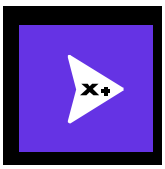
STOP button: stops the machine in the automatic cycle only



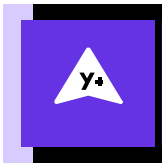
Head lowering speed potentiometer

Disk rotation speed potentiometer

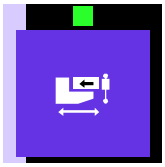
Function Key:
Calling up program No.
Scrollimg the cursor
Storing data
Storing programs
Selecting programs
Storing parameters



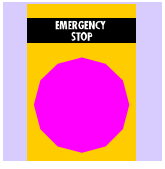
Manual movement of feed carriage forward



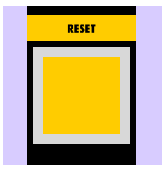
Head up key



Main vice closure

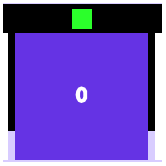


EMERGENCY mushroom: pressing this button all the operations of the machine stop immediately. To reset the emergency, rotate the actuator by 45°



RESET key: resets the machine after an emergency condition or conflicting commands.

Start button: starts the cutting cycle

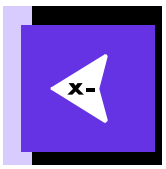


Speed de–selection key (zero)

Cutting force control potentiometer

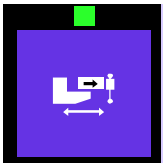
Function key:
In automatic work mode, allows you to enter programming and return to execution
In programming work mode, allows you to switch between the program cuts and select program displays

Function Key:
In automatic work mode, allows you to delete the last program carried out by loading the new one to be carried out
In programming work mode, allows you to delete existing or incorrect data
When entering cutting or machine parameters, allows you to delete existing or incorrect data



Manual movement of feed carriage backward

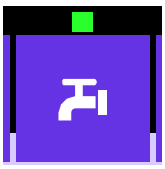
Head down key



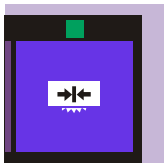
Main vice opening

Gun sprays lubricant/coolant fluid even when the machine is stopped

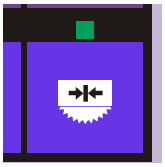
Jet of lubricant/coolant fluid from taps, only when the cycle has started



No lubricant/coolant fluid jet



Button for memorizing the FCTI (Head Upstroke Limit)



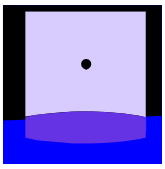
Button for memorizing the FCTA (Head Downstroke Limit)

Button to open and close the timed door of the cutting head

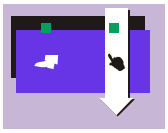
Chip discharger unit in manual mode

Chip discharger unit deactivated

Chip discharger unit in automatic mode



Decimal point for entering numerical values in tenths of a millimetre or thousandths of an inch when programming parameters and cutting lenghts.



Selecting operating mode

F0: Function Key:
Takes you from single to multiple programming in automatic work mode

F1: function key
At machine start up, it allows programming the setup parameters.

F2: Function key not operational

F3: Function Key:
Selects semi–automatic work mode in the main menu

F4: Function Key:
Selects Automatic work mode in the Main menu

F5: Function Key:
Resets total cutting time counter in semi–automatic work mode

F6: Function Key:
Selects diagnostic work mode in the main menu
zeroing command
Enables step=length check in automatic work mode

F7: function key
in automatic mode it enables the selection of the single cycle i.e. the basket change cycle, or the continuous cycle

F8: Function Key:
–Allows operator to enter blade thickness value in automatic work mode

F9: Function Key:
Takes you from the first display to the zero–setting display
Takes you from the zero–setting display to the main menu
Takes you back to the main menu

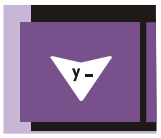
Basic instructions for carrying out a cutting cycle

Manoeuvring the cutting head

In the **TIGER 370 CNC–MR** model, it is possible to move the cutting head with up and down buttons, shown in the key of the control panel in this chapter.

Head up key Y+

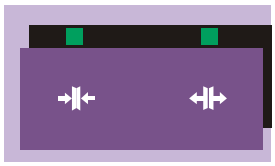
Head down key Y-



Access to the cutting head

To ensure operator safety, the machine is entirely enclosed by safety guards that prevent accidental contact with the tool and moving parts. To access the cutting zone it is necessary to unlock the device closing the door.

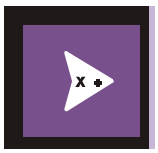
Button to open/close the door of the cutting head



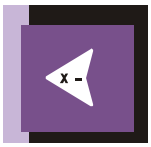
Manoeuvring the feeder

The power supplier can be moved with the buttons reported on the diagram below, only after having reset the power supply (as explained in the “machine start up” paragraph).

Forward key X+



Back key X-



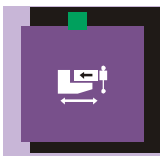
Clamping the work piece in the vice

Vice opening and closure, for the cutting vice and the feeder vice, are controlled by the corresponding buttons on the control console.

Cutting Vice close button

Cutting vice open button

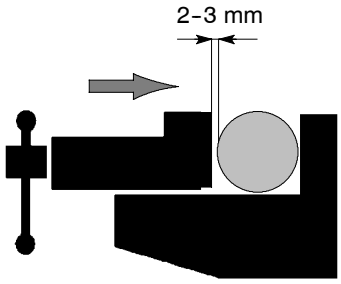
Feeder vice close button



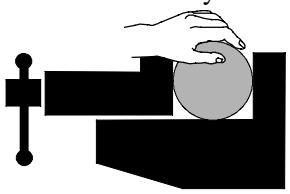
Feeder vice open button

However, to ensure that the workpiece is securely clamped in the vice, proceed as follows:

- make sure the workpiece dimensions do not exceed the machine's cutting capacity;
- make sure the piece is correctly supported on both sides of the machine;
- move the vice to within 2÷3 mm of the workpiece using the handwheel. Press the vice closure button on the console;



- make sure that the material is well blocked by trying to move it manually, as the vice cylinder has a stroke of 6 mm only.



Lubricant/coolant fluid supply

It is possible to select the operating mode of the coolant by means of the specific buttons on the control panel:

Technological control parameters

The following table indicates the control parameters which are shown on the displays of the semi−automatic, automatic and Automatic Loop operating cycles.

X =1000,5	X−axis dimension (position of feeder carriage)
θ =00,00	Nonoperating
W =000.0	Nonoperating
F =0	Cutting head descent speed potentiometer
S = 15	Disc rotation speed (rpm)
Kg=000	Nonoperating
DL=0	Nonoperating
SL= 3	Blade thickness (depends upon machine model)
AM=5,8	Max. blade motor absorption
A =0,7	Amperometer
T =00,00	Partial cutting time
TT=00,00	Total machine time for the cutting cycle

Preliminary check list for cutting operation

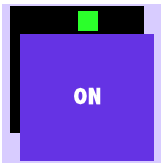
To guarantee complete safety during cutting cycles, the operator should work through a check list of the entire apparatus, checking:

- ensure that the disk guard completely surrounds the tool when it is not in use;
- that the work piece is properly clamped in place;
- ensure that the blade teeth are appropriate for the material being cut;
- that the speed selected is right for the kind of piece to be cut;
- that all protections are in place and correctly locked;
- lubricant/coolant level and activation of the electropump;
- the blade downstroke speed must be correct.

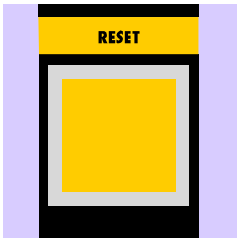
Starting up the machine

When switching on the machine, proceed as follows:

▶ press the ON button.



▶ Press RESET twice.



The display shows the introductory and starting SCREEN.

▶ To continue press F9.

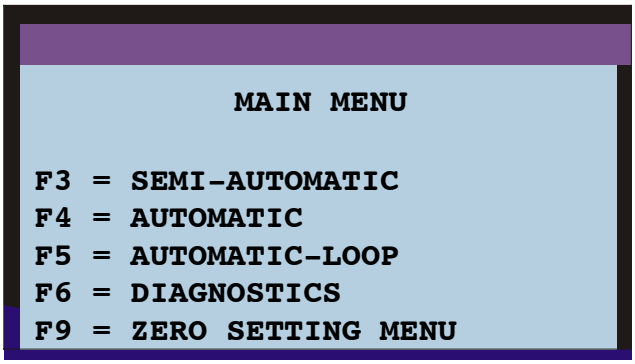
▶ The display suggests ZERO SETTING the machine. To carry out this operation, press F6. To go to the main menu, press F9.

During zero setting, the display will read ZERO SETTING IN PROGRESS, which will continue to be displayed until the operation has been completed. While zero setting is taking place, only the EMERGENCY button is active.

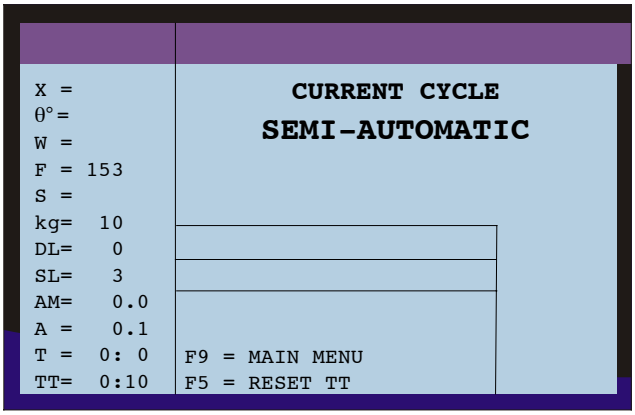
▶ When ZERO SETTING has been completed, the display will show the COUNT STARTING VALUE for the X axis. Press F9 to continue.

Semi-automatic operating cycle

▶ Starting from the main menu, press F3 to put the machine in SEMI–AUTOMATIC mode.



▶ The display will show the screen for the SEMI–AUTOMATIC cycle.



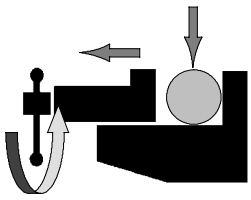
Technological control parameters

X =1000,5	Nonoperating
θ =00,00	Nonoperating
W =000.0	Nonoperating
F =0	Cutting head descent speed potentiometer
S = 15	Disc rotation speed (rpm)
Kg=000	Nonoperating
DL=0	Nonoperating
SL= 3	Blade thickness
AM=5,8	Assorbimento motore
A =0,7	Amperometer
T =00,00	Partial cutting time
TT=00,00	Total machine time for the cutting cycle

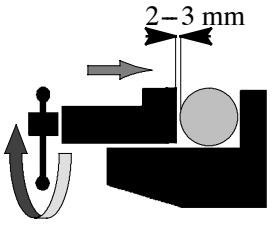
Clamping the work piece in the vice

▶ Release the protection by pressing the relevant key;

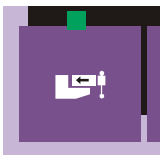
▶ open the vice by rotating the handwheel anti−clockwise and position the workpiece between the jaws.



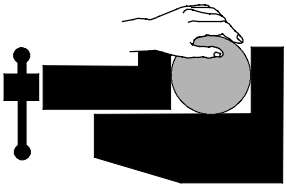
▶ Bring the moveable jaw to within 2÷3 mm of the workpiece by rotating the handwheel clockwise.



▶ Block the piece by means of the pneumatic cutting vice block, by pressing the close cutting vice button.



▶ Check that the workpiece is effectively locked in positon!

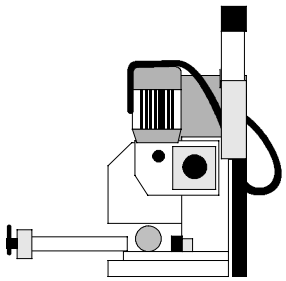


N.B. If the vice was already closed by the pneumatic piston, it may not block the piece. In this case it is necessary to repeat the operation, i.e.: open the vice by pressing the specific button, bring the moving jaw near to the piece and block it again with the closing button, bearing in mind that the stroke of the pneumatic piston is approx. 6 mm.

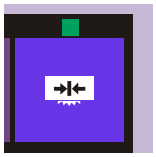
Cutting stroke adjustment

▶ Once the workpiece is locked in position, the cutting stroke must be adjusted. When the head down button is pressed, the cutting head is automatically lowered.

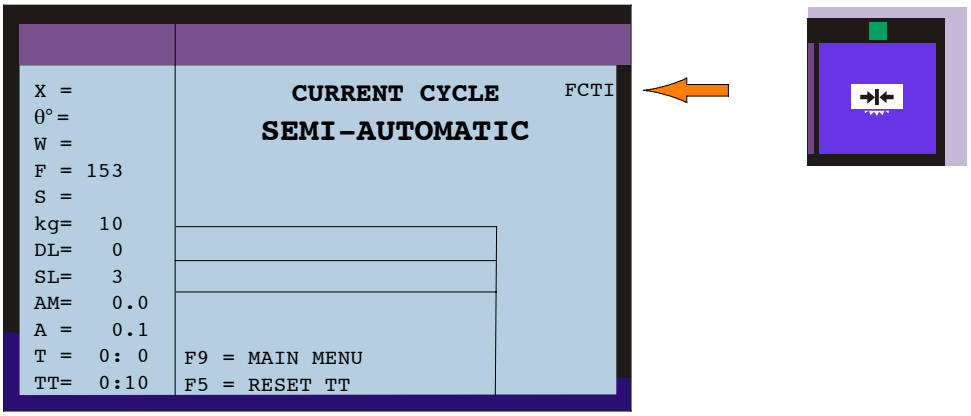
▶ Keep the button pressed until the disk is at 5/10 mm from the material to be cut.



▶ Memorize the FCTI (Head Upstroke Limit) by pressing the specific button;



▶ after pressing the FCTA memorizing button, the display will indicate that it has been memorized.



▶ The FCTI (Head Downstroke Limit) will be restored at the end of the cut.

Preparing to cut

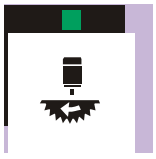
▶ Select the fluid for automatic operation by pressing the specific button. The led of the relative button will light up.

▶ Adjust the head descent speed potentiometer to 0 to avoid undesirable starting speeds.

Cutting

▶ Close the protection and press the reset button;

▶ Enable motor rotation by activating the blade motor selector on the control console;

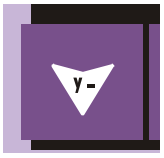


▶ start operation.

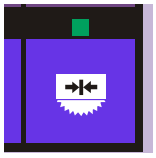
N.B. At this stage it is possible to adjust, according to the type of material, the 2 parameters which influence the cut: the disk rotation speed and the head downstroke speed, through the relative potentiometers on the control panel.

Now the blade starts, the cutting cylinder is under pressure and the lubricant/ coolant supply starts.

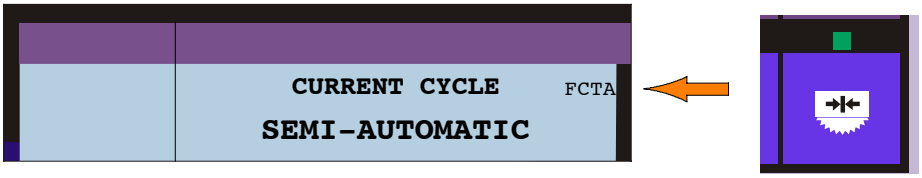
N.B. In this phase, pressing the head dowstroke button, the FCTA spot is deleted.



▶ When the machine arrives at the end of the cut it is necessary to memorize the FCTA position, by pressing the relative button;

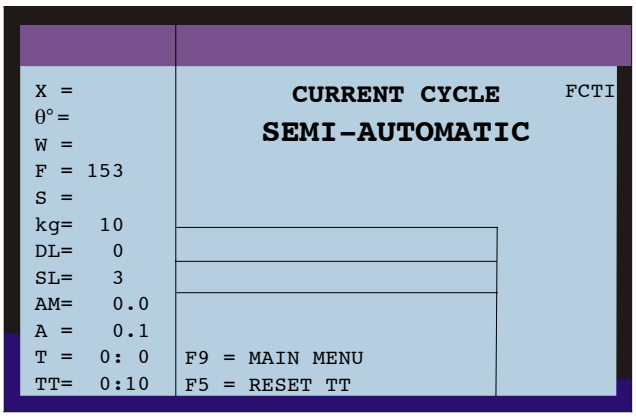


▶ when the machine reaches the position to start cutting again, the symbol to indicate the FCTA upstroke limit will re−appear on the display.



▶ At the same time, the disk will stop and the cutting head will return to the start of cut position (FCTI).

▶ When the head arrives at the start of cut position, the display will indicate the FCTI position.

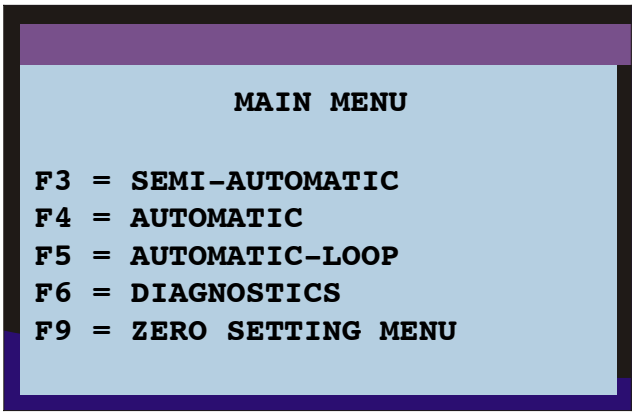


▶ Next, the machine automatically opens the cutting vice.

The machine is ready to carry out a new cutting cycle.

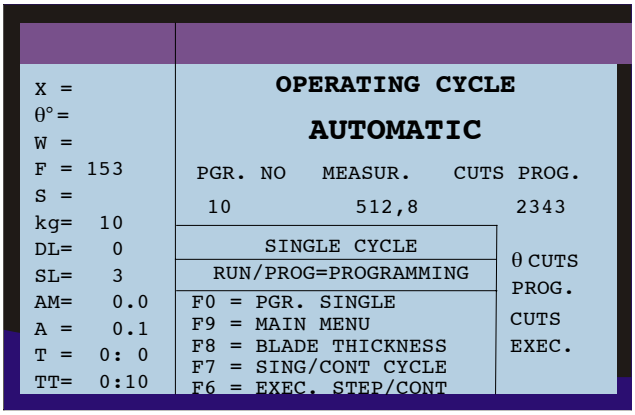
Automatic operating cycle

▶ Return to the main menu to change the operating mode. To return to the MAIN MENU press F9.



▶ Now press the F4 button to go to the AUTOMATIC cutting cycle.

▶ The AUTOMATIC screen shows the parameters inserted for the last operation completed.



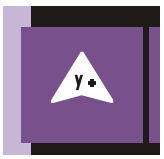
PROGRAMME DATA	PGR. NO. = When the AUTOMATIC cycle screen switches on, the programme number for the last programme memorised is displayed, irrespective of whether it was totally or partially completed or only saved. The control memory allows 32 programmes to be memorised as well as the single programme. The latter programme is indicated by the number 0.
	MEASUREMENT = As for the situation described above, the MEASUREMENT value displayed also relates to the last programme memorised. The control memory allows cutting lengths of up to 9999,9 mm. to be memorised. The cutting length can be programmed to an accuracy of a tenth of a millimeter. PRECISION ±0.1 mm. 0÷1000 mm (Precision as regards the position of the feeding car and not to the cut part)
	CUTS PROG. = In the case of the number of CUTS PROGRAMMED, the same information as above applies. It is possible to set a maximum number of cuts of 9999 pieces for each programme.
	CUTS EXEC. = The number of CUTS EXECUTED displayed relates to those effectively completed before the machine was last switched off. These will remain in the memory until they are replaced by further cuts carried out using the same programme, or until they are zero set or modified by a new programme.
OPERATING BUTTONS ACTIVE DURING THE AUTOMATIC CYCLE	F0 = SINGLE PROGRAMME: Press this button to access the single programme. Using this option, programming can be done directly on the work screen. The single programme allows 1 MEASUREMENT and 1 QUANTITY of cuts to be carried out. This possibilty has been included to avoid multiple programming procedures when these are not necessary.

OPERATING BUTTONS ACTIVE DURING THE AUTOMATIC CYCLE	F9 = MAIN MENU: press this button to return to the working mode selection menu.
	F8 = BLADE THICKNESS: this option gives access to programming of the BLADE THICKNESS. This parameter is very important because the bar infeed system operates in zero setting mode, therefore the value of the scrap produced by the disk must be added to the size of the piece to be processed. Adding and subsequent division by the number of runs necessary to obtain the required measurement, will be carried out independently on the control console.
	F7 = SING/CONT CYCLE: this operation is more easily understood if the SINGLE CYCLE is called the CHANGE TOTE–BOX cycle. In practice, when a number of measurements and pieces are programmed for the same bar, this option allows them to be kept separate, stopping the machine at the end of each programme.

Inserting and locking the workpiece

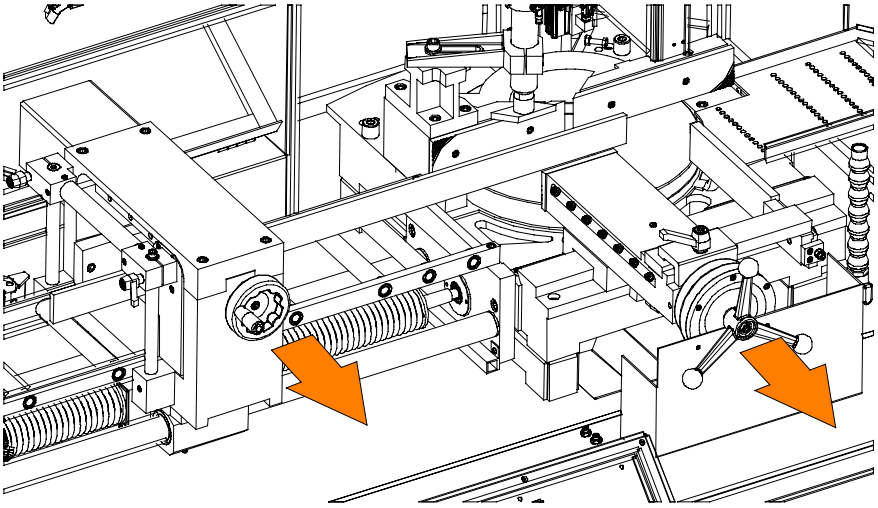
Initially the machine could be configured in any way, therefore the first series of operations to be carried out is to set the machine for the material to be cut.

▶ Bring the cutting head to the upstroke limit, using the manual head lift button;

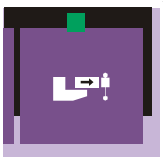


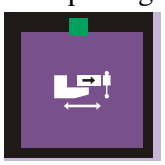
▶ Release the protection by pressing the relevant key;

▶ open the cutting vice and the infeed vice by rotating the relative handwheels; then adjust the position of the anti–chip vice indicated by the arrow.



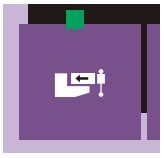
▶ After this second operation, check that the pneumatic piston is in open position. To do this, use the supply vice and cutting vice opening buttons.



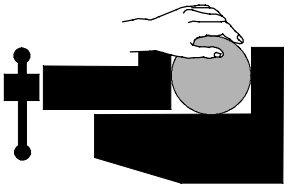


It is advisable to use the buttons a number of times, to be totally familiar with operation.

- The second series of operations are to fit the material to be cut: place the material between the vice jaws, and draw one end under the blade in order to perform an initial cut to initialize the cuts.
- After inserting the material, bring the moving jaws for the cutting and feeder vices to within 2÷3 mm of the workpiece;
- activate the automatic pneumatic vices to block the piece, using the two vice closing buttons;



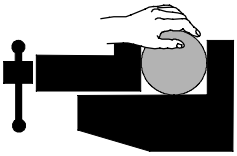
- check that the piece is well blocked;



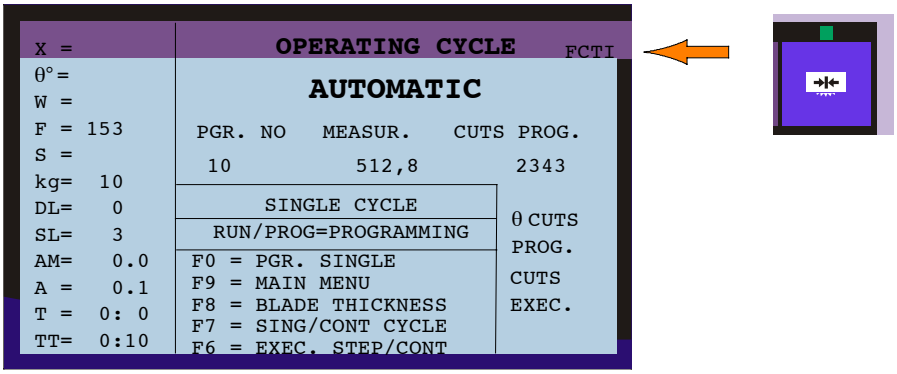
to avoid deformation when the tubes are thin walled, or the blocking force of the vices is not sufficient for materials which are particularly hard or with articulated sections, adjust the vice pressure by means of the regulator located inside the base.

Preparing to cut

- Close the protection and press the reset button;
- adjust the cutting stroke by memorizing the head upstroke limit (FCTI): bring the cutting head near the material using the head downstroke button.



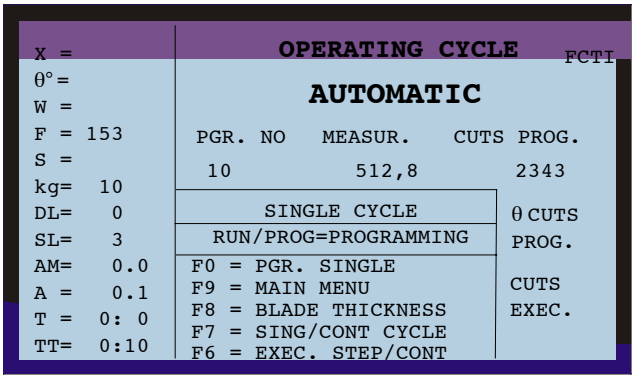
- Memorize the cutting start position by pressing the FCTI (Head Upstroke Limit) button. The FCTI indication will appear at the top of the display on the right hand side.



Programming cuts

Once the material to be cut has been inserted and blocked, bring the cutting head to the FCTI (Head Upstroke Limit) position, set the cutting dimension indicated

on the display as Measure, and the amount of pieces to be cut Prog. cuts.



For the cutting program it is necessary to set the following parameters:

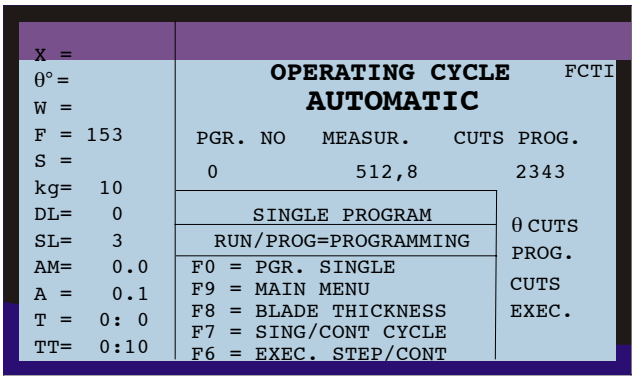
- PGR. N. = PROGRAM NUMBER: this value identifies all existing programs, therefore it is possible to select a program previously memorized by setting a number, or the number proposed by the controller can be accepted.
- MEASUREMENT = MEASUREMENT OF PIECES: This value is keyed in, using the numeric keys, in mm and tenths of a mm, or in inches and thousandths of an inch, relates to the selected programme.
- PROGRAMMED CUTS = NUMBER OF PIECES TO BE CUT PER MEASURE: set this value using the numeric keys in relation to the PGR. N. and MEASURE set.

The machine's control console allows cuts to be programmed in two ways:

- SINGLE PROGRAMME: This option enables programming on the work screen, setting the measurements and number of pieces to be obtained from the workpiece.
- MULTIPLE PROGRAMMING: With this programming system 32 cutting lengths can be set with relative number of pieces to be cut for each dimension. Furthermore, selecting the programs, it is possible to set cutting sequences with different measures on the same bar.

Single program

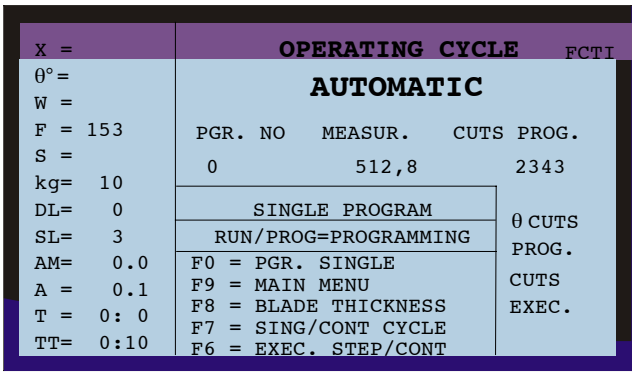
▶ To set the measure and number of pieces in the single program, press F0.



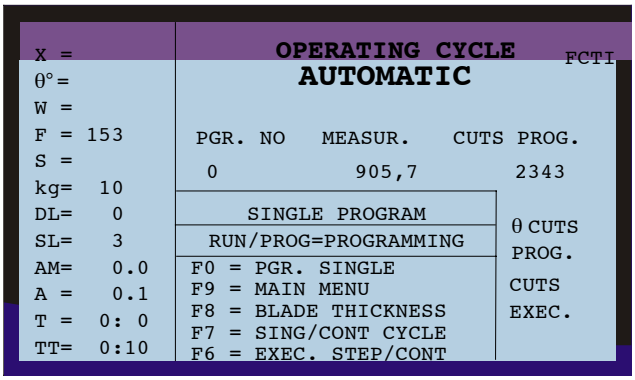
▶ When the F0 button has been pressed, the display reads:

PGR. NO. 0
MEASUREMENT The last measurement programmed
CUTS PROG. The last number of cuts programmed
CUTS EXEC. The portion of the last job executed. The type of pro-

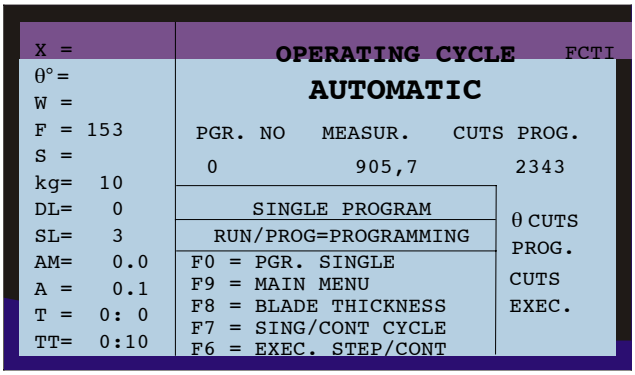
gramme in use will appear in the first square: SINGLE PGR. To begin programming, press RUN/PROG.



▶ When the RUN/PROG button has been pressed, the measurements will be reversed, indicating that they can be changed. To set new measurements, key in using the NUMERIC KEYS. Enter the measurement 905,7 (for example). To do so the following keys must be pressed: “9” “0” “5” “.” “7”

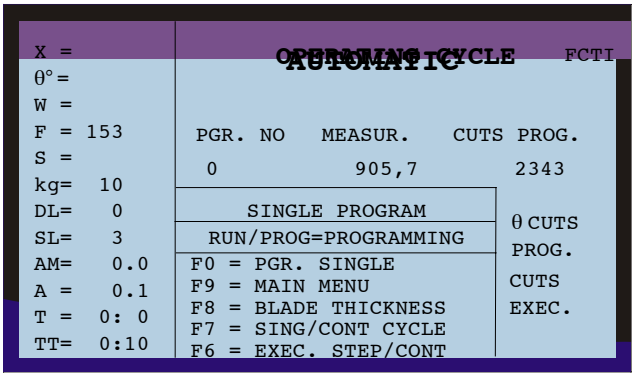


▶ Pressing the numeric keys, the numbers are displayed from right to left. If you make a mistake when writing the measure, press CLEAR to delete the value; 0.0. will appear. After entering the measure, press ENTER. With this operation you will obtain two results:
1) the new value is memorized;
2) the reverse moves to PROG. CUTS to set the desired number of cuts.



▶ With the reverse on PROG. CUTS, set the number of cuts to be executed using the numeric keys as for the previous operation. Digit 100, pressing in order buttons “1” “0” “0”; then press ENTER again. With this operation you will obtain two results:

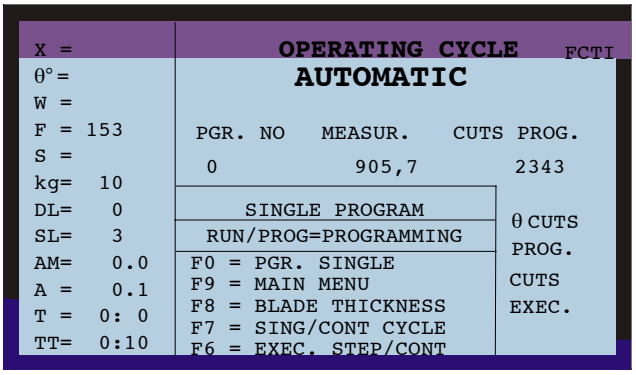
1) the new value is memorized;
2) the reverse moves to NR PGR.



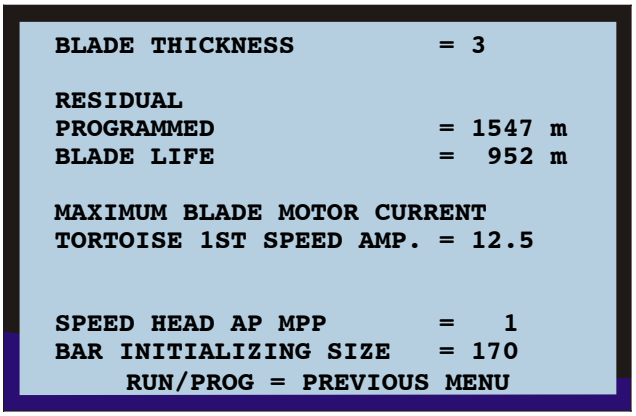
▶ End of programming. Press RUN/PGR to return to execution.

N.B. Whenever CLEAR is pressed in the single program automatic mode, when the machine is stopped, the count of the cuts executed previously is reset.

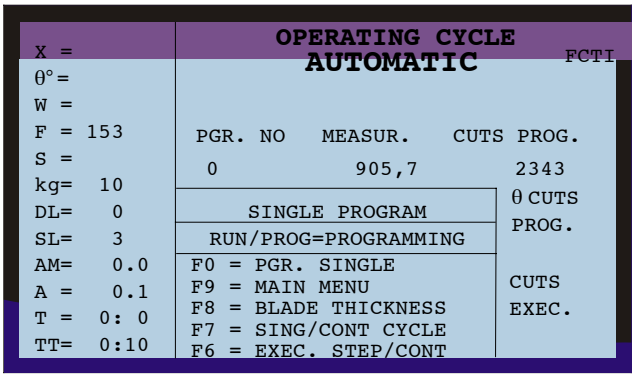
▶ After pressing RUN/PGR, the reverse will disappear from the display; this indicates that the machine is ready for operation. To confirm the new program, press CLEAR; this will produce two results:
1) confirmation of the program to be executed
2) count reset of cuts executed previously.



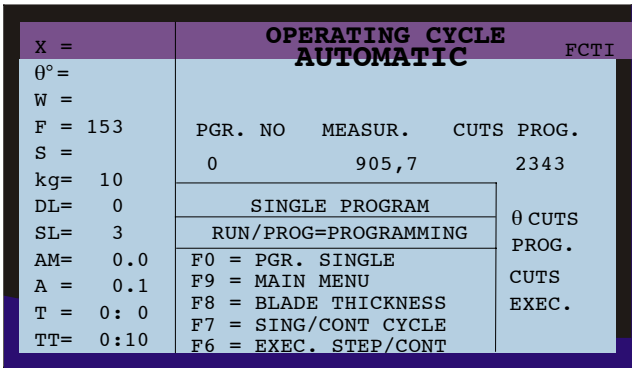
▶ Enter the value BLADE THICKNESS which must be programmed every time the tool is changed. It is necessary to add also the blade thisckness to the cutting measure, because the bar supply system works when the carriage is at zero, i.e. after being cut, the piece is on the right of the blade, and this value is subtracted from the total length of the finished piece. Press F8 to enter this value.


BLADE THICKNESS = 3
RESIDUAL
PROGRAMMED = 1547 m
BLADE LIFE = 952 m
MAXIMUM BLADE MOTOR CURRENT
TORTOISE 1ST SPEED AMP. = 12.5
SPEED HEAD AP MPP = 1
BAR INITIALIZING SIZE = 170
RUN/PROG = PREVIOUS MENU

▶ After pressing F8 the display will show BLADE THICKNESS. To enter the value press in order the numeric keys and the decimal point. To memorize the new value press ENTER again. Of course, in case of a typing error, it is possible to correct it by pressing CLEAR. Once the operation is complete, press RUN/PROG to return to the operating display screen.

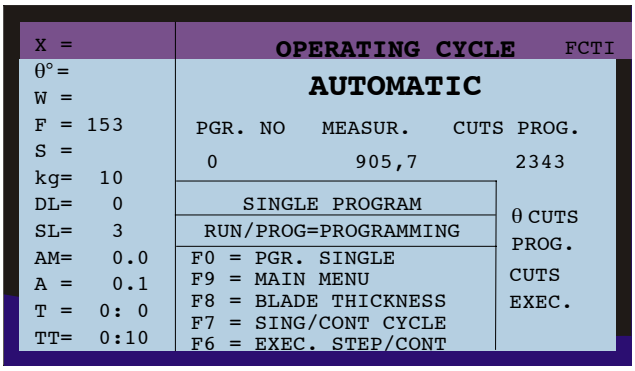


▶ Now it is possible to start operation. To check the measure of the piece cut, press F6; in the first box the indication STEP will appear.

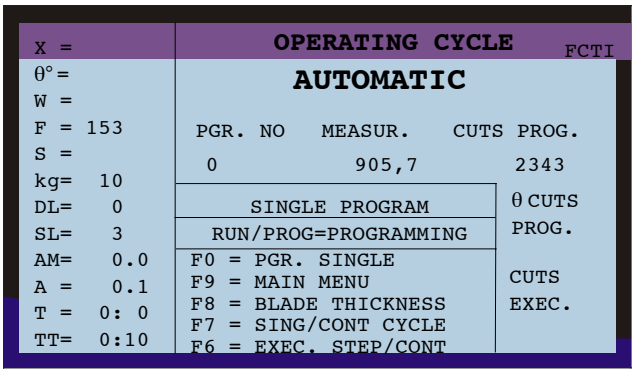


▶ After pressing F6, the machine proceeds as follows:
– START
– INITIAL CUT
– BAR SUPPLY
– CUT IN AUTOMATIC MODE
– STOP.

The machine performs the first cycle of operations, to cut to size the first piece. This enables a precise check of the measure of the piece. If the size is correct, press F6 again to deactivate the check cycle, then press START.



▶ If the size is not correct, use the BLADE THICKNESS parameter to enter the correction value. Repeat the cut with the check cycle activated. In this case the machine will perform the following operations:
– START
– BAR SUPPLY
– CUT IN AUTOMATIC MODE
– STOP.
In other words, the machine starts again where it had stopped, automatically changing the size with the set adjustment, and supplying the bar with the new measure. Check the size again, and if it is correct, press F6 to delete STEP, then press START.



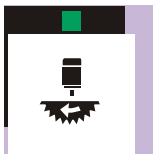
▶ Select the cutting speed.

▶ Select the fluid for automatic operation by pressing the specific button. The button led will light up.

▶ Set the head descent speed regulator to 0 to prevent inadvertent movement of the cutting head, once the cycle starts.

Cutting

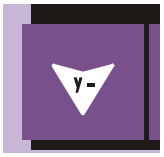
▶ Enable motor rotation by activating the blade motor selector on the control console;



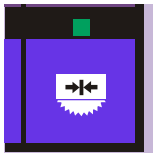
▶ start operation.

Now the blade starts, the cutting cylinder is under pressure and the lubricant/coolant supply starts. At this stage it is possible to adjust, according to the type of material, the 3 parameters which influence the cut: the disk rotation speed and the head downstroke speed, through the relative potentiometers on the control panel.

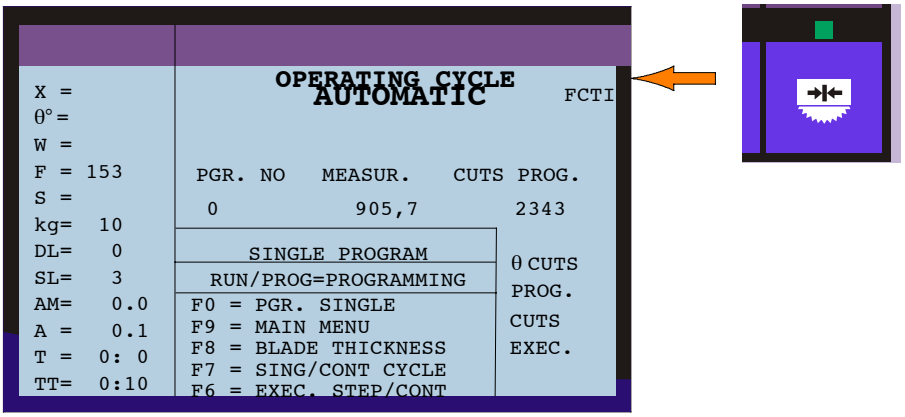
N.B. In this phase, pressing the head dowstroke button, the FCTA spot is deleted.



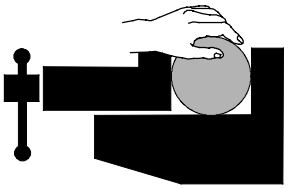
▶ When the machine arrives at the end of the cut it is necessary to memorize the FCTA position, by pressing the relative button;



▶ once the FCTA memorising button has been pressed, the display will show the symbol confirming memorisation.



▶ Then the machine will bring the head to the FCTI spot, and will deliver the material to execute another cut in the set mode: step or continuous.

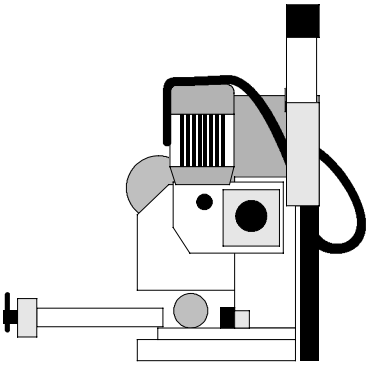


N.B. Every time the machine finishes a cut the number of CUTS EXEC. is updated by one unit. The initial cut, and the cuts executed after an emergency, are not counted.

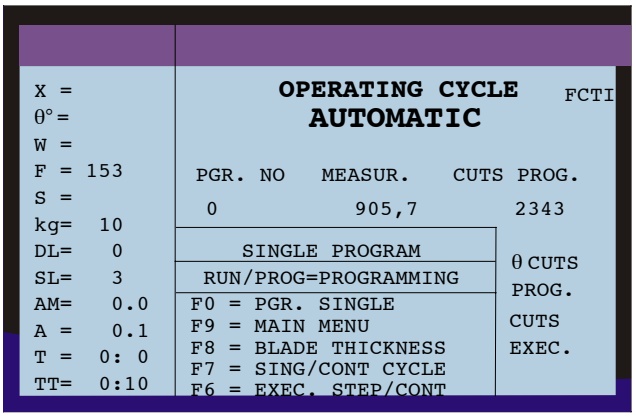
▶ The machine can stop in two ways, when in automatic mode: BAR FINISHED or CUTS FINISHED in both cases, all that is required to exit these situations is to press the RESET button, following which the machine will again be ready to begin a new cutting programme, or cutting a new bar. In both cases a clear message will be displayed.

▶ The cuts programmed in the SINGLE PGR. have finished. The display will show the relative message;

▶ the machine stops in position to start cutting.

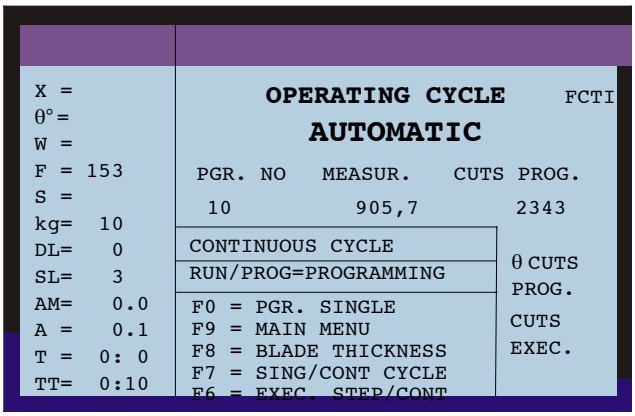


▶ Pressing RESET the display return to the operating screen, displaying the data of the program in progress. Press CLEAR to reset the cuts previously done.

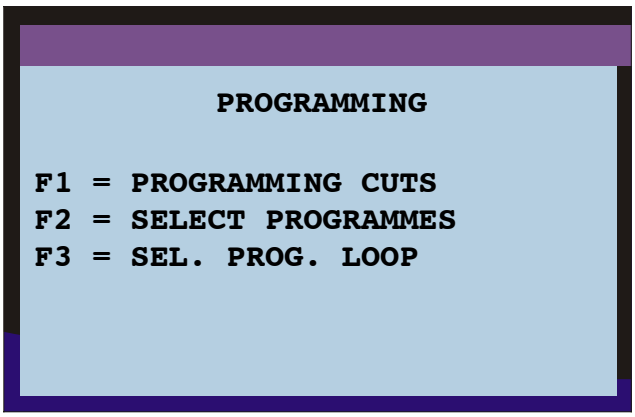


Multiple programming

- Press button F0 to access the MULTIPLE PROGRAMMING. The display proposes the data of the last program executed before switching off the machine, or before the SINGLE PGR.
- The first box will show the message referring to one of the two operating modes of the automatic program:
  1) CONTINUOUS CYCLE: sequence programs;
  2) SINGLE CYCLE: one program at a time.
  Press the RUN/PROG button to set operation and to enter the data.

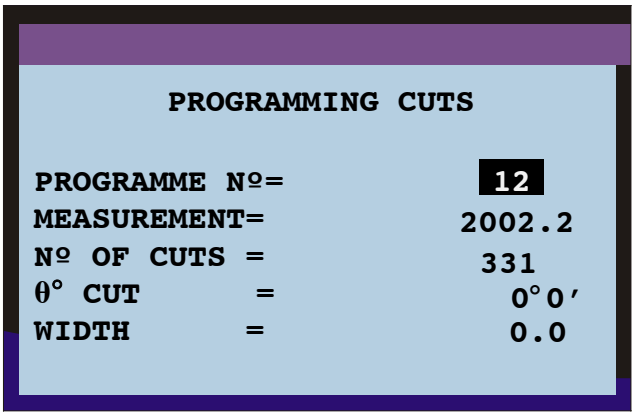


- After pressing the RUN/PROG button, the display will show a programming screen to program cuts and select the programs to be executed. The function of each button is described in the message. To access CUT PROGRAMMING press F1.

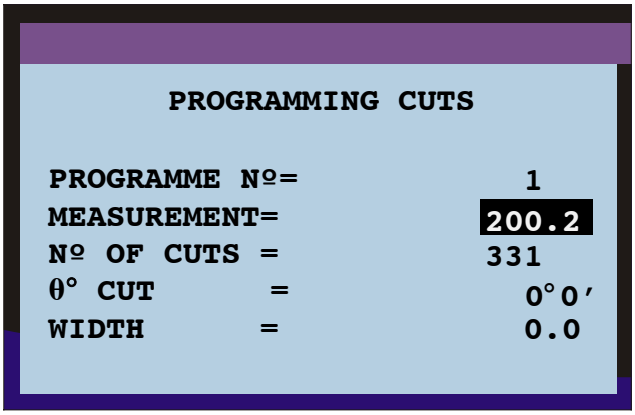


- The first CUT PROGRAMMING display screen shows the program number in reverse, which means that it is possible to change the value. Start entering the operating parameters from program No. 1; to enter the program number

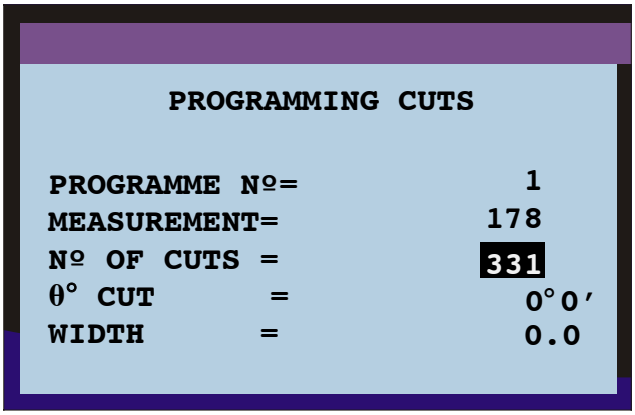
press the numeric key1: the old value will automatically be replaced by the new one.



▶ After pressing 1, press ENTER. With this operation you will obtain two results:
1) the desired program number is memorized;
2) the reverse moves to measure, which means that it is possible to change its value.

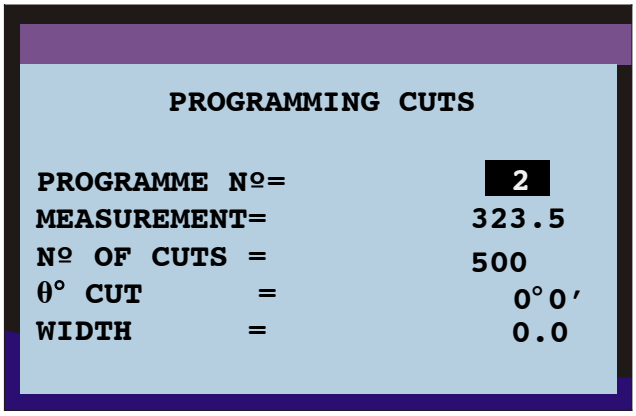


▶ With the reverse on MEASURE the value of the first batch of pieces to be cut can be entered, i.e. L=178; to enter this value press the numeric keys in order. Any typing mistakes can be deleted by pressing CLEAR. After digiting the numbers, press ENTER; the reverse will pass to CUTS No.



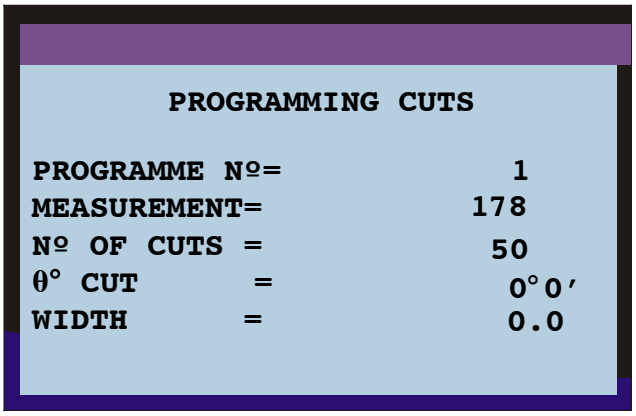
▶ Repeat the same operation to set the number of cuts; press in order the numeric keys 5 and 0. After digiting the numbers press ENTER. With this operation you will obtain two results:
1) the new value is memorized;

2) the display screen scrolls automatically to show the next program, i.e. PGR. NUMBER 2.

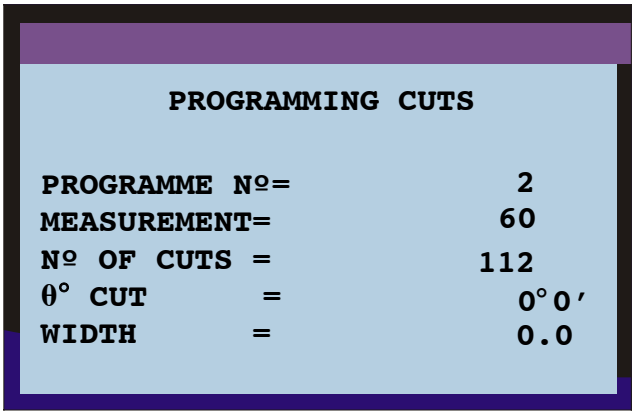


▶ At this point, the operator can chose whether to set operation in this program (no.2), or to select PROGRAM POSITION number and enter new values, as described previously. Proceed with setting the programs in order.

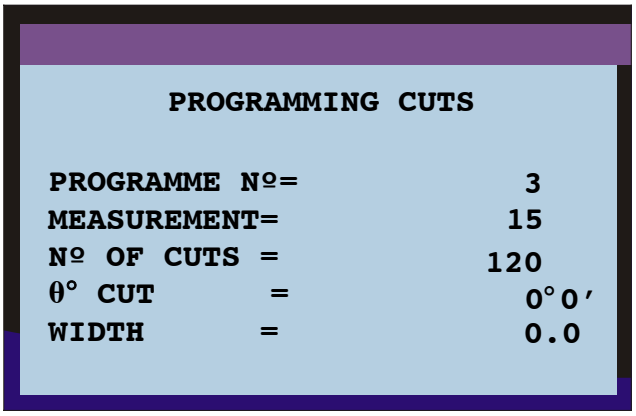
FIRST PROGRAMME



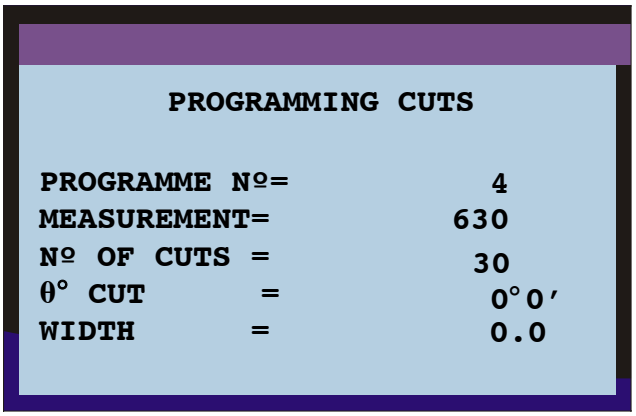
SECOND PROGRAMME



THIRD PROGRAMME

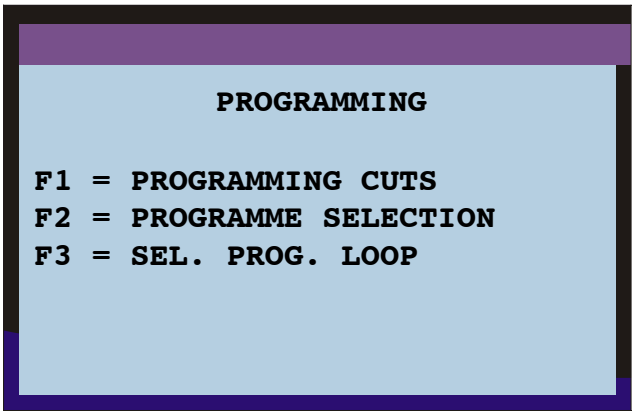


▶ After setting all the cutting programs, press ENTER. The last value entered will be memorized and the display will scroll to the next program.



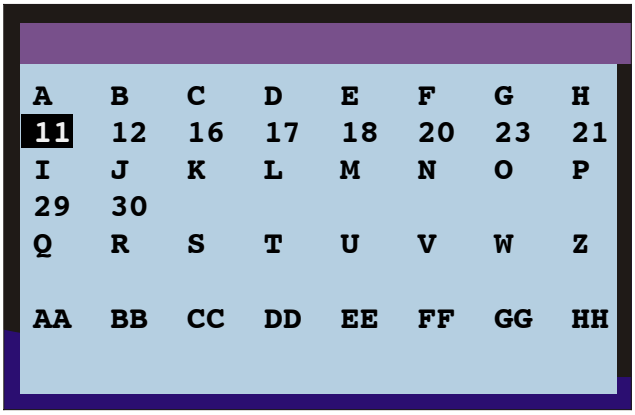
▶ Once the programs have been set, press the RUN/PROG button to quit Cut Programming.

▶ After pressing the RUN/PROG button, the display will show the Programming screen. Now the programs to be executed must be communicated to the controller. To do this press F2.

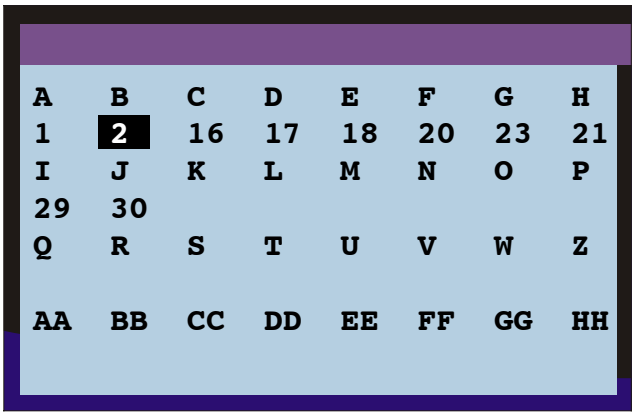


▶ Set the sequence of programs to be executed, up to maximum 32. The display screen shows the cursor in position A, and the last program numbers set in order of execution. There is no limit in relation to the programmable order, whether it be in increasing, decreasing, repetitive or jump order, nor in relation to the minimum number of programs.

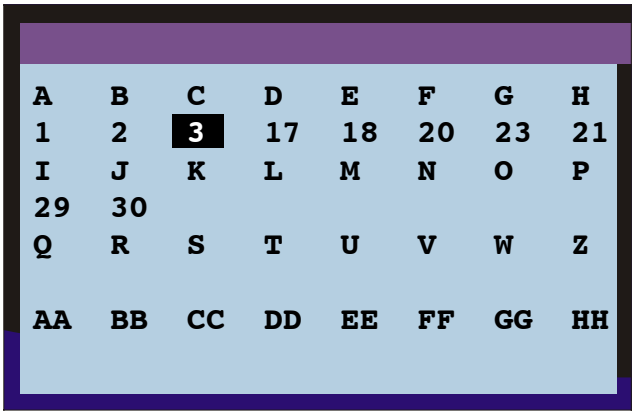
▶ Press the numeric keys to set the programs: digit 1 to set the 1st.



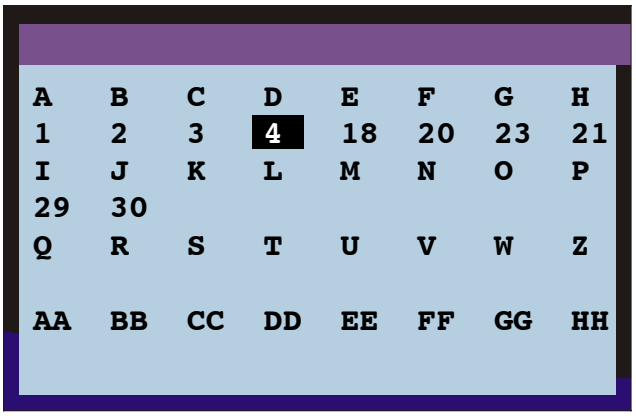
▶ After pressing the numeric key the value is immediately updated. As usual, in case of typing errors, it is possible to correct them by pressing CLEAR. After setting the new program to be executed, press ENTER. The new value is memorized and the cursor moves to the next position.



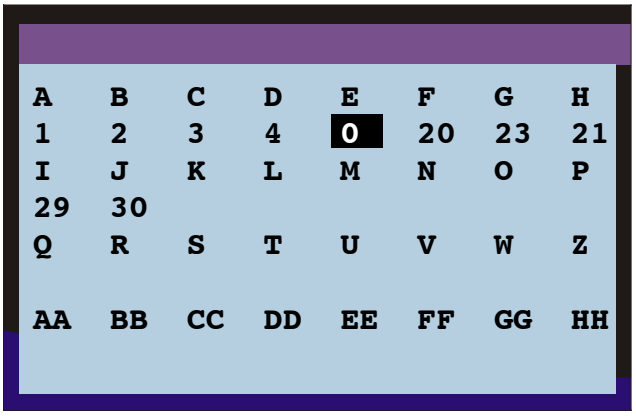
▶ Set the second program by pressing the numeric key 2, then press ENTER. Proceed as described above for the remaining cutting programs to be executed.



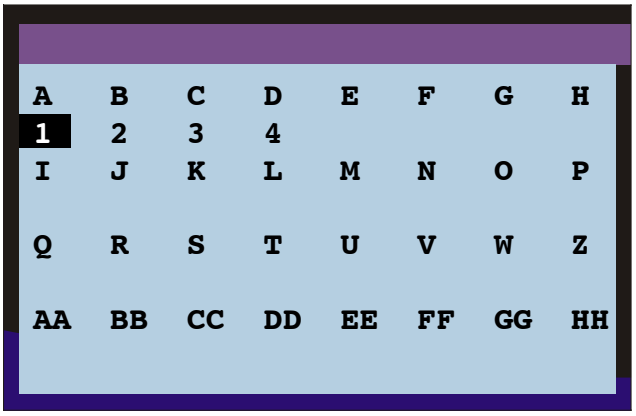
- Select the third programme by pressing the numeric key: 3 and press: ENTER. Repeat the operation to select the last cutting programme to execute.



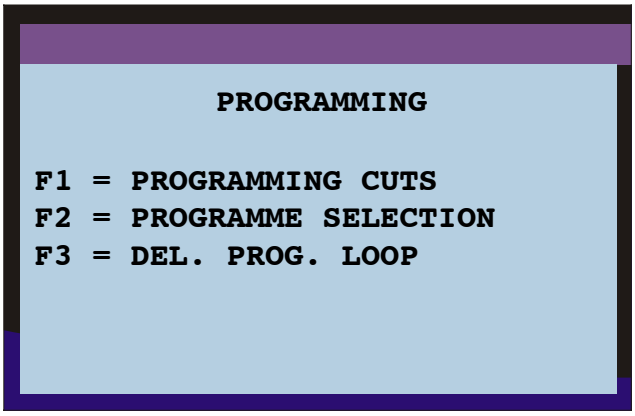
- Once the last program has been set, complete the selecting operation by pressing CLEAR.
- After pressing CLEAR, the previous value is deleted and 0 appears. To confirm the end of the programming operations and that only the first four programs are to be executed press ENTER again.



- At this point, all the other programs memorised are deleted, and the cursor returns to the first position. Now it is possible to return to the operating display screen by pressing the RUN/PROG button.



▶ Pressing the RUN/PROG button again, the PROGRAMMING display screen returns.



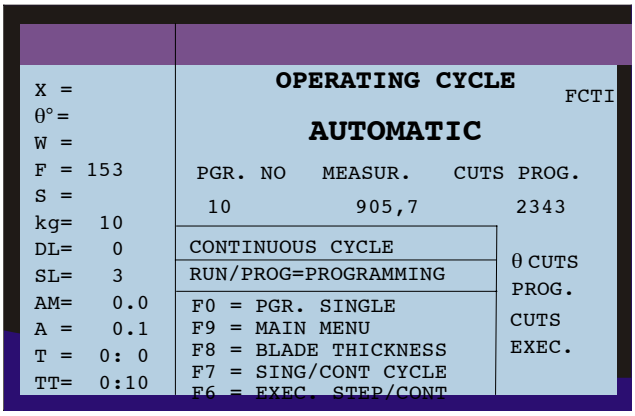
▶ Pressing the RUN/PROG button, the operating display screen returns, where no parameter has been changed yet. To activate the new program set, press CLEAR. With this operation you will obtain two results:
1) the data of the previous program is deleted from the memory;
2) the data of the new program is entered.

▶ After pressing CLEAR, the display screen will show the data of the new program being executed.

N.B. Whenever CLEAR is pressed in the automatic operation mode in the multiple programming, with the machine stopped, the operation in progress is reset. This means that if the machine has performed some cuts of the first program, and it is stopped by pressing CLEAR, the cuts already executed are reset. When the machine restarts it will start from the initial cut and therefore from the first cut programmed. If the machine is stopped by pressing CLEAR during the execution of a program after the first, for example the second or third, the display will return to the first program of the series programmed, resetting the number of cuts executed in all the programs performed until that moment. When the machine is restarted, the machine will start from the initial cut, i.e. from the first cut of the first program.

The second operating mode in Multiple Programming is the Single Cycle.

▶ The message Single Cycle will replace Continuous Cycle by pressing F7.

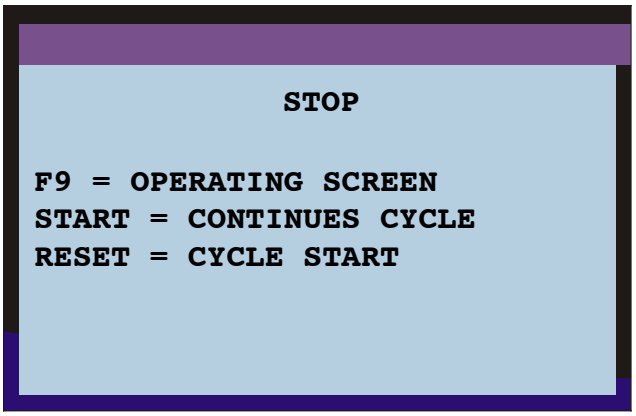


Activating this option the machine will operate as follows: at the end of the cuts in each program, the machine will stop and wait for a new START command. This allows replacing the piece collection container, in order to separate pieces of different sizes. To return to the Continuous cycle mode press F7.

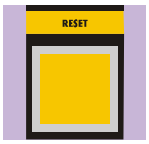
Multiple programming cuts

Press the START button to re–start the cutting cycle.

- When the START button has been pressed, the display reads AUTOMATIC EXECUTION. In this mode, all manual commands are blocked. The commands available when the machine is cutting are: EMERGENCY – RUN/ PROG – STOP.
- Press STOP with the machine cutting;

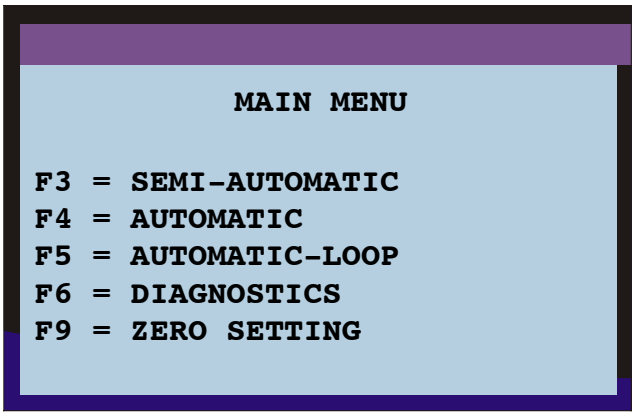


- after pressing STOP the machine stops with the last operation in progress. In other words, if the machine was cutting, it stops with the blade on the cut and waits for the next instructions. This control is important for the use of the machine: for example, when the machine is started without having set the program to be executed, or when the cut or supply are not correct, or whenever it is necessary to momentarily stop the machine.

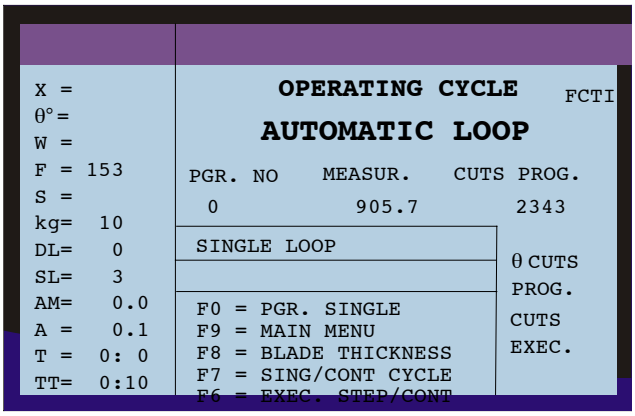
	BEGIN CUT = Pressing RESET the display returns to the operating screen and the machine returns to the cutting start position. This is to correct the necessary parameters and restart the cycle.
	CONTINUOUS CYCLE = If during the cut or material supply something falls into the machine, a tool or cloth or something else, it is necessary to stop the machine by pressing STOP to draw it out. Press START to activate the machine again.
	WORK SCREEN = In case of doubts concerning the program in progress, after pressing STOP and the machine is stopped, it is possible to return to the operating screen by pressing F9, leaving the program in progress. After verifying the doubts, press F9 to return to the STOP screen and decide whether to restart the cycle by pressing START or stop it by pressing RESET.

Automatic loop operating cycle

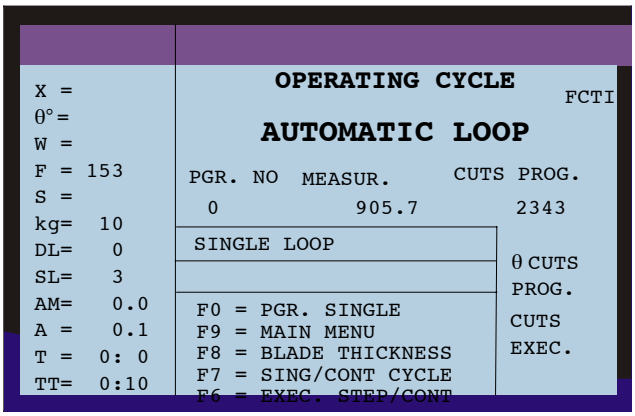
- Press F9 to pass to the main menu and change operating mode.
- Press F5 to pass to tha cutting cycle in AUTOMATIC LOOP. This mode enables the machine to execute cuts with different depths and lengths on the same bar.

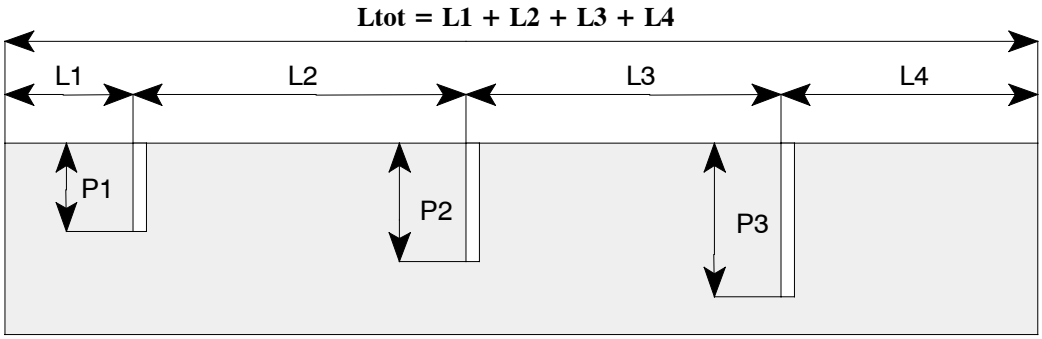


- Press F7 to select the LOOP mode, that can be single or continuous.
- SINGLE LOOP: this operating mode is used to cut material at preset depths (P1, P2, P3) and lengths (L1, L2, L3), while the possibility of intervening in the work cycle on completion of each LOOP executed, is retained.

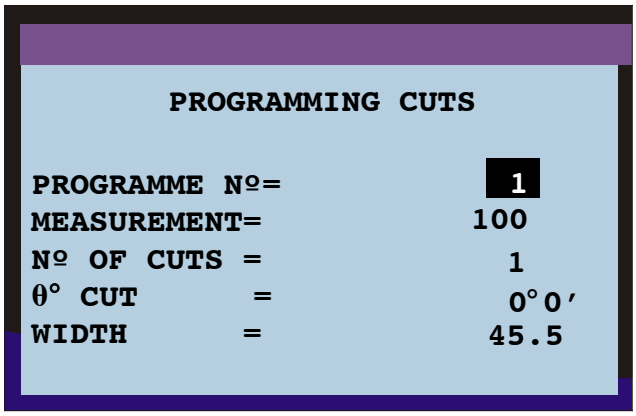


- CONTIUOUS LOOP: this operating mode is used to obtain preset depths and lengths of cuts on material, with LOOP repetitions up to 99 times.

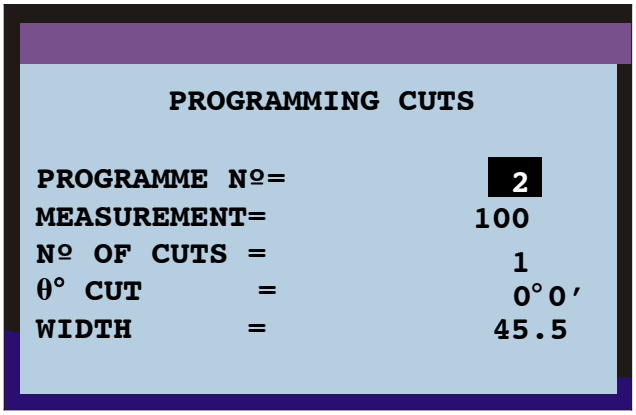




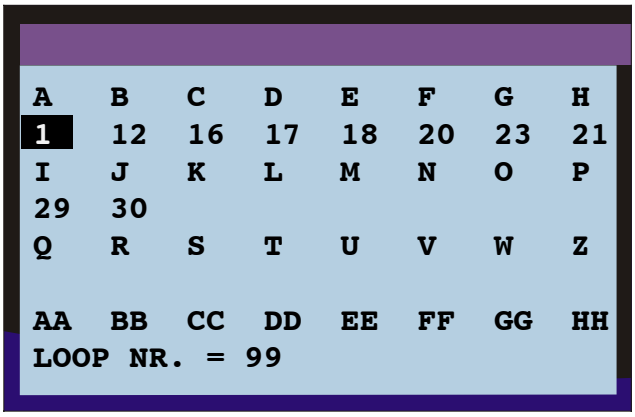
- Prepare for cutting as if for an automatic cycle (see the instructions in the relevant paragraph).
- Set cutting parameters as indicated in the automatic cycle paragraph, for programme data and technological machine control parameters.
- By pressing run/prog. programming is accessed. Press the F1 button, to programme cuts.
- Key in the values for each field and confirm each piece of data input by pressing ENTER.



- When ENTER is pressed again, the screen for the second LOOP programme appears. Proceed to input the data for further programmes. When completed, press RUN/PROG. Press the F3 key on the programming screen, which relates to LOOP PROGRAMME SELECTION.

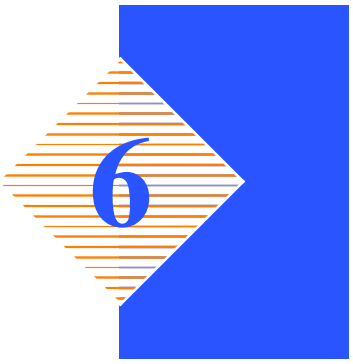


- All that remains to be done, is that the sequence of execution of cutting programmes is to be established. Key in the programme numbers, to correspond to the letters, confirming each one by pressing ENTER.



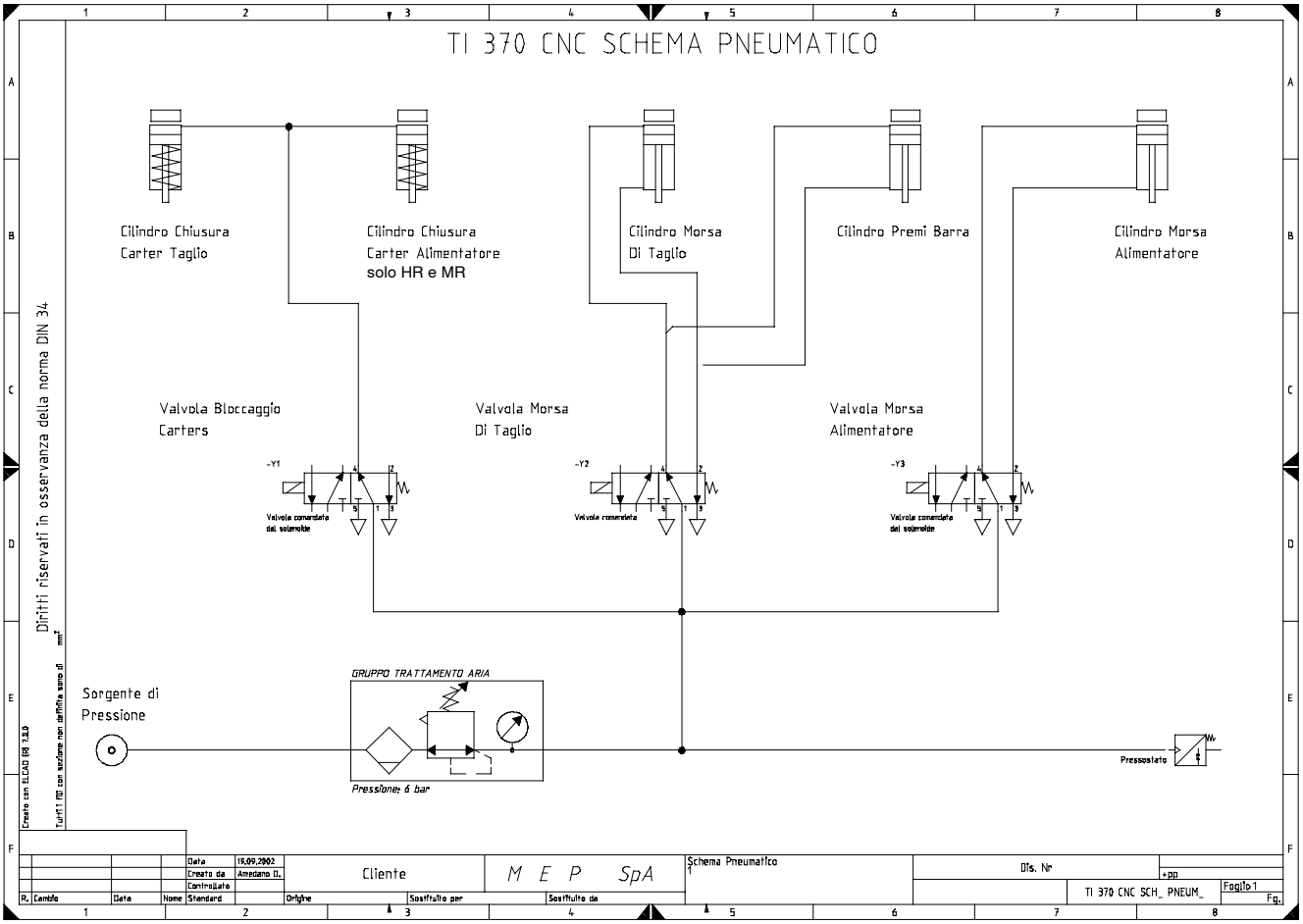
- Also key in the number of LOOPS if using a continuous work cycle. Press RUN/PROG. to proceed.
- The display screen will show the parameters of the first program set. Pressing START the machine is reset and performs the initial cut before starting the LOOP. Then the supply unit places the material of the length set in the first program and the head descends to execute the cut. PROGRAMMING FCTA will appear on the display. Once the cutting depth has been reached, reset the head downstroke regulator by stopping the cutting head stroke; then press the Head Downstroke Limit (FCTA) memorizing button.
- Memorise the cut depth for the second programme and so on for all programmes selected. On completion of this operation the user can select whether the cuts should be carried out in single or continuous mode, by pressing F7.

Diagrams, exploded views and replace-ment parts

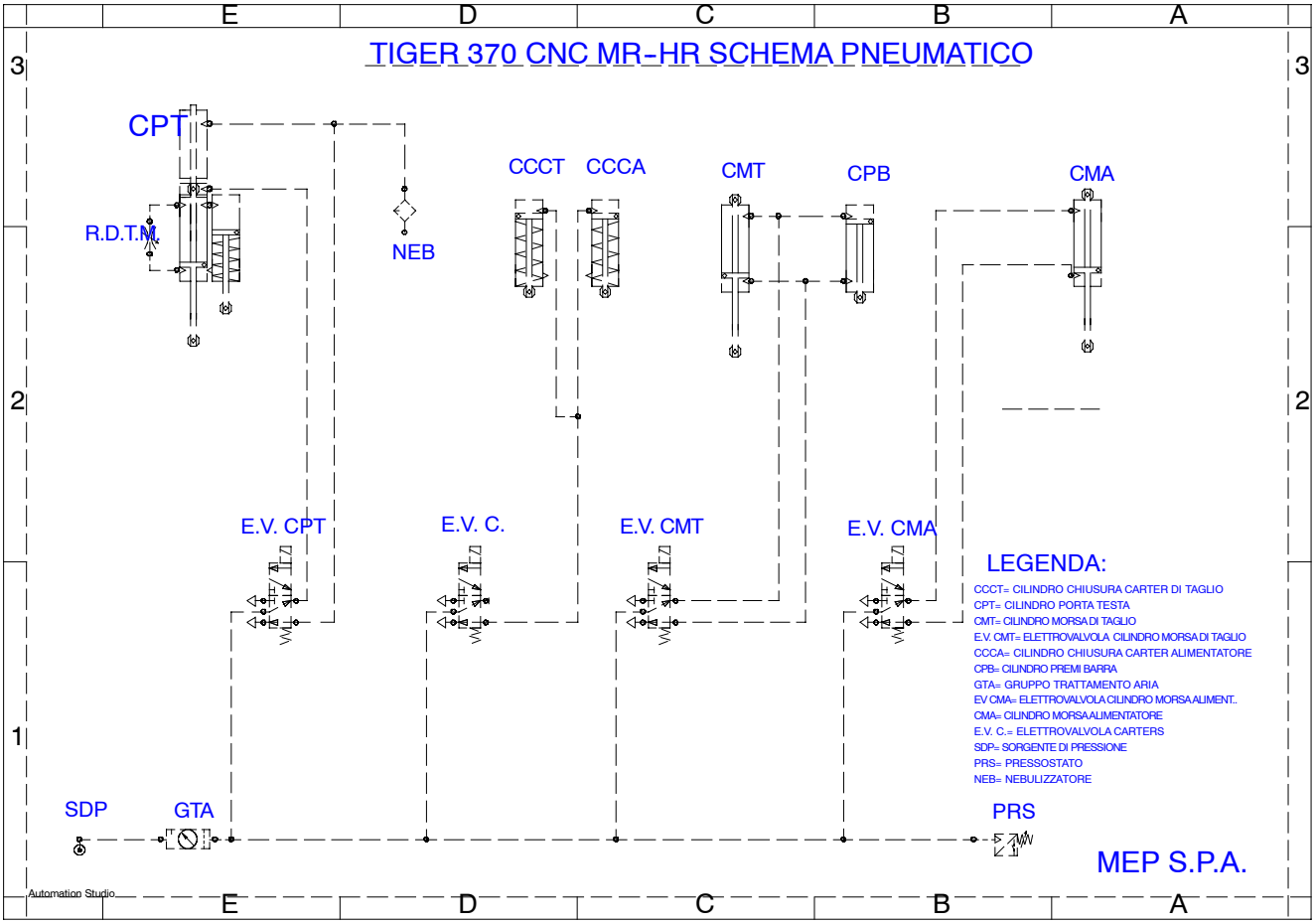


This chapter contains functional diagrams and exploded views of the **TIGER 370 CNC–MR**. This document is intended to help in identifying the location of the various components making up the machine, giving information useful in carrying out repair and maintenance operations; This chapter will also enable the user to order replacement parts with no risk of misunderstanding, as all parts are given codes.

Pneumatic diagram TIGER 370 CNC-MR



Pneumatic diagram TIGER 370 CNC-FE HR



APS/P drive for step motors

FOREWORD

This drive allows you to control a step motor, using the input steps (STEP−IN). The motor completes one step on the LOW−HIGH transition of this signal.
When the DIRECTION input is connected to +12 Vdc/+24 Vdc the motor will turn clockwise. When it is disconnected, or connected to 0V the drive will turn anti−clockwise.
When the ENABLE input is connected to +12 Vdc/+24 Vdc the drive is disabled (current on motor = 0) resulting in the rotation of the motor being interrupted. When it is disconnected, or connected to 0 V, the drive will be re−enabled and the motor will be energised after at least 1 step is started.
When the CURRENT REDUCTION input is connected to +12 Vdc/+24 Vdc the current on the motor will be reduced. When it is disconnected or connected to 0V the current will be returned to the regular level.
The rate of acceleration/deceleration, the current, and the step division, can be adjusted using the dip−switches and trimmers on the card (see tables).
The two outputs allow the machine to display if the drive is protected (READY_OUT) and if positioning in progress has finished (BUSY).

CHARACTERISTICS

CUT	APS3/P
VDC NOM. [V]	40−80
VDC MAX. [V]	90
VDC MIN. [V]	30
I MAX. [A]	10
I MIN. [A]	1
I PASSO [A]	0.5
Operating temperature [° C]	0-55

MEANING OF THE PARAMETERS IN THE TABLE

- **Vdc nom:** Nominal voltage at which the drive can be powered.
- **Vdc max:** Maximum voltage at which the drive can operate, where this limit is exceeded the protection intervenes, inhibiting the operation of the drive itself.
- **Vdc min:** Minimum voltage at which the drive can operate. When the voltage drops below this limit, the protection intervenes, inhibiting the operation of the drive itself.
- **I max:** Maximum value for the phase current.
- **I min:** Minimum value for the phase current.
- **I step:** Difference between the settable current values.
- **Operating temperature:** Forced ventilation is necessary for currents exceeding 6A.

TECHNICAL CHARACTERISTICS – APS/P DRIVE	
Power supply	Terminal Name: + HV (Positive power supply) GND (0 V)
Engine connection	PHASE A1 = Phase A1 of the step motor PHASE A2 = Phase A2 of the step motor PHASE B1 = Phase B1 of the step motor PHASE B2 = Phase B2 of the step motor
Outputs	Of a PNP optoinsulated type “open collector” (10 mA max)
	Also optoinsulated, so an external power supply (+12V/+24V) must be connected to the terminal common to the optoinsulators (Pin 12 connector J2). Maximum current for each output (10 mA).
Inputs	Of a PNP type (from 12 Vdc to 24 Vdc)
	Not optoinsulated: jumper JP1 – inserted Pin 12 of connector J2 – connected to +15V auxiliary (pin 21 connector J2) (common input optoinsulators)
	Optoinsulated: jumper JP1 – not inserted Pin 18 on connector J2 – connected to GND of outside power supply (common input optoinsulators)
Protections and safety devices	Protections against short circuits: – between outputs – between outputs and the positive power supply terminal If one of the conditions above occurs, the drive will disable the power bridge, and display the error conditions on the screen: “u” = wrong power supply voltage value “t” = thermal protector intervention “c” = max. current protector intervention. due to a short circuit across the phases, or excess current. If the drive is not disabled by a protective device, the display will indicate the letter “r” (ready).
	Thermal protection against overheating
	Mains undervoltage and overvoltage safety devices

INPUTS	
SIGNAL	**FUNCTION**
DISABLE	Disables the power bridge (current on motor=0)
CURRENT REDUCTION	Reduces the current on the motor. The percentage reduction can be set at from 25% to 50% of the regulated current using dip A1.
DIRECTION	Select the direction of rotation. The signal must remain stable for at least 50 microseconds before and 50 microseconds after the low–high transition of the STEP–IN signal.
STEP–IN	The motor carries out a step on the low–high transition of this signal. It is preferable to use a square wave with a duty–cycle of 50 %. The absence of this signal for 0,5 sec determines the automatic reduction of the current (stand–by condition). The percentage reduction for stand–by can be set at 25% or 50% of the regulated current, using dip A1.

OUTPUTS	
OUT1 BUSY	BUSY: this open collector output indicates if the drive is busy positioning or if it is at the correct level. Drive at level: low level. Drive occupied: high level.
OUT2 DRIVE_READY	DRIVE_READY: this open collector output indicates if the drive is ready or if a protection device has intervened. Drive protected: low level. Drive ready: high level.

RATE ADJUSTMENT

It is possible to set the rate of acceleration/deceleration for the motor from a minimum of 1 ms to a maximum of 2 s (the time indicated refers to an acceleration from 1 Hz to 10 KHz), using the DIP A 3–6.

Rate value table				
DIPA 3	**DIPA 4**	**DIPA 5**	**DIPA 6**	**RAMPA [ms]**
OFF	OFF	OFF	OFF	1
OFF	OFF	OFF	ON	10
OFF	OFF	ON	OFF	20
OFF	OFF	ON	ON	30
OFF	ON	OFF	OFF	50
OFF	ON	OFF	ON	70
OFF	ON	ON	OFF	100
OFF	ON	ON	ON	150
ON	OFF	OFF	OFF	200
ON	OFF	OFF	ON	300
ON	OFF	ON	OFF	400
ON	OFF	ON	ON	500
ON	ON	OFF	OFF	800
ON	ON	OFF	ON	1000
ON	ON	ON	OFF	1500
ON	**ON**	**ON**	**ON**	**2000**

SETTING DIVISIONS OF MOTOR STEPS

It is possible to set the division of the motor steps using DIP–SWITCHES B 2 and 3.

DIP SWITCH B		
DIPB 2	**DIPB 3**	**STEP DIVISION**
ON	OFF	Complete Step (200 steps/rev)
ON	**ON**	**Half Step (400 steps/rev)**
OFF	OFF	Quarter Step (800 steps/rev)
OFF	ON	Eighth of a Step (1600 steps/rev)

ADJUSTING THE CURRENT

To adjust the current:
– Position DIP B–4 to the ON position (current adjustment mode).
– Rotate trimmer RV6 until the screen displays the current required (clockwise to increase).
Adjustment range: from 1A to 10A step 0.5A.
– Return DIP B–4 to the OFF position (RUN mode).

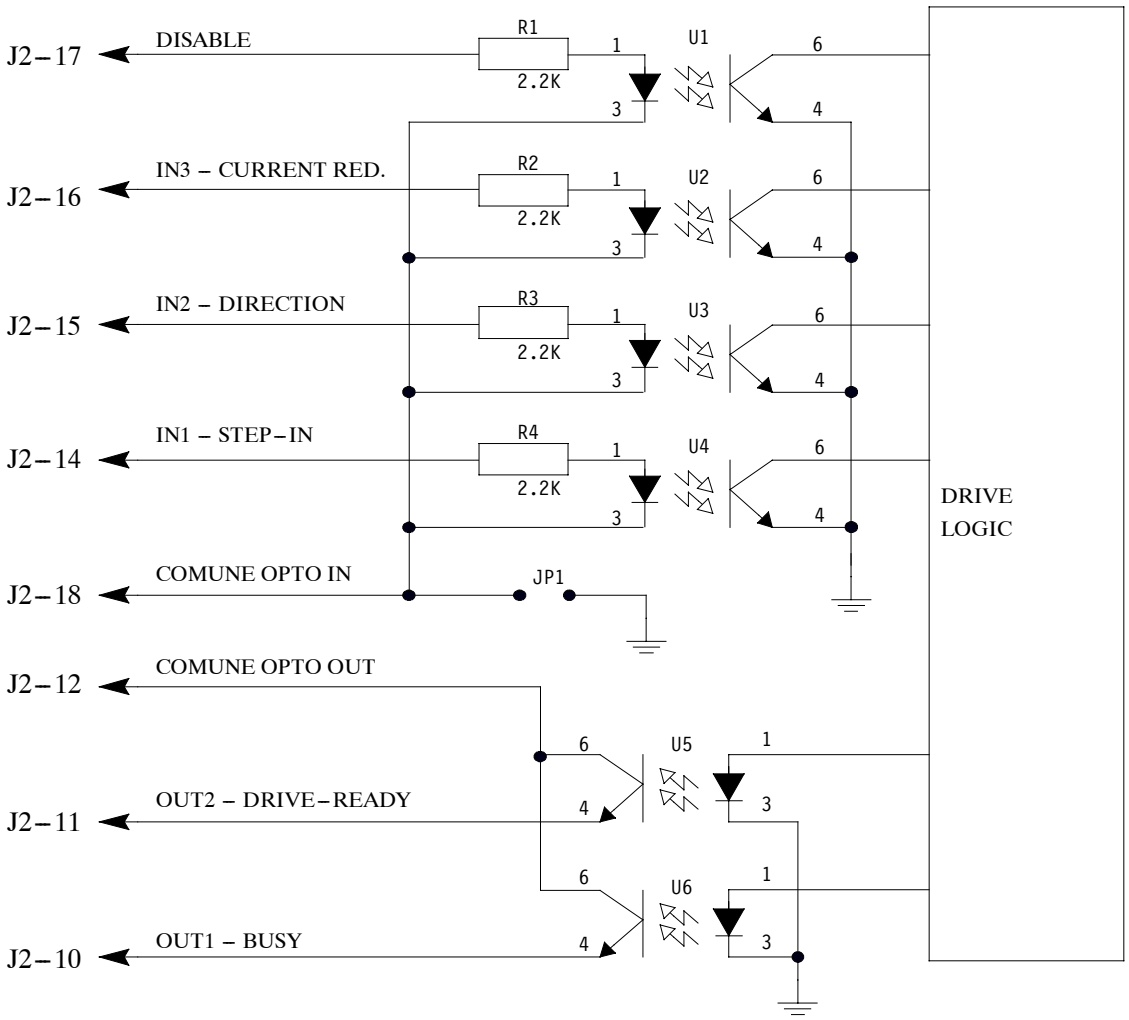
VALUE DISPLAYED	CURRENT SET
1	1 A
5	5 A
5.	5.5 A
0	10 A
A	11 A
B	12 A

N.B. Adjust the current witn tne motor stopped.

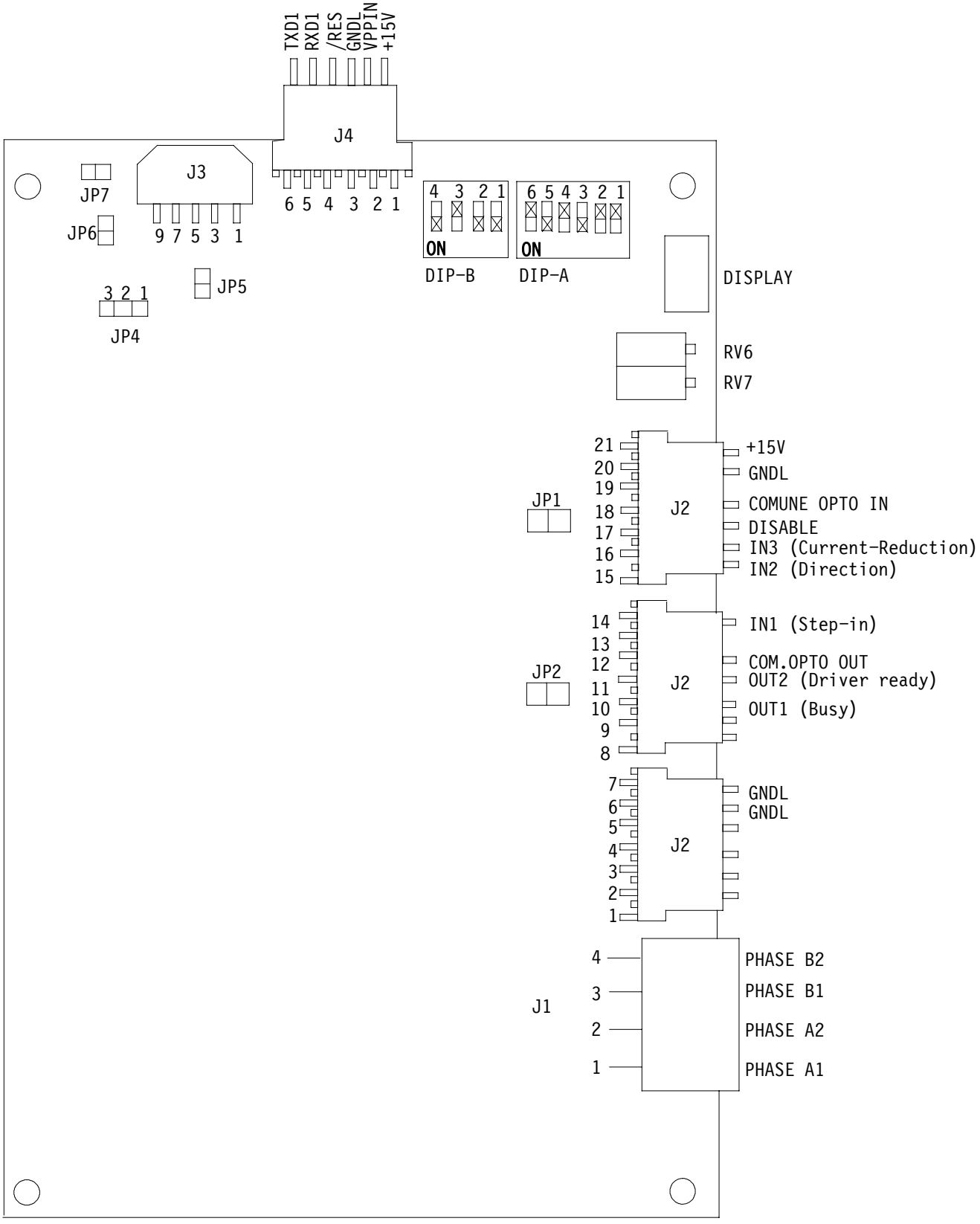
DIP-SWITCHES SUMMARY TABLE

DIP SWITCH A		
DIP	**ON**	**OFF**
6	Set Rate	Set Rate
5	Set Rate	Set Rate
4	Set Rate	Set Rate
3	Set Rate	Set Rate
2	Not used	Not used
1	Reduction of current in stand–by mode to 50% of set current	Reduction of current in stand–by mode to 25% of set current
DIP SWITCH B		
DIP	**ON**	**OFF**
4	Current adjustment mode	RUN mode
3	Step division setting	Step division setting
2	Step division setting	Step division setting
1	Not used	Not used

SCHEMATIC CONFIGURATION OF INPUTS / OUTPUTS



LAYOUT OF APS/P DRIVE COMPONENTS

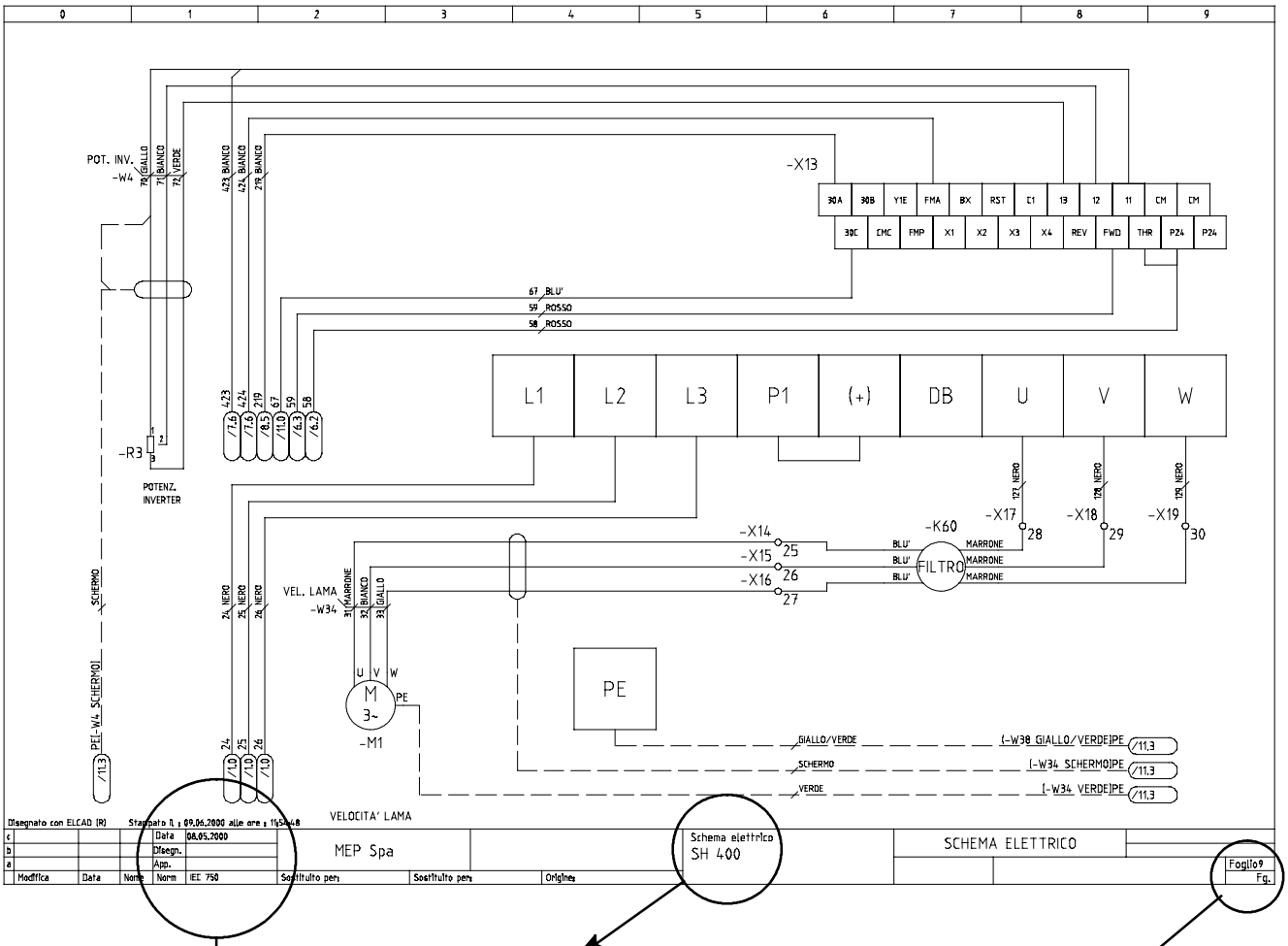


How to read the wiring diagrams

With the introduction of the new standardised wiring diagrams, the following gives an illustration of the way in which they have been drawn up.

Each sheet of the project contains a box which gives the following information:

The numbers indicate the columns into which the entire drawing is divided



Schema elettrico
SH 400

Indications of the model of machine

Data	08.05.2000
Disegn.	MARIO ROSSI
App.	
Norm	IEC 750

Indications of the date production started

Identification of the designer

Identification of the Reference Standard

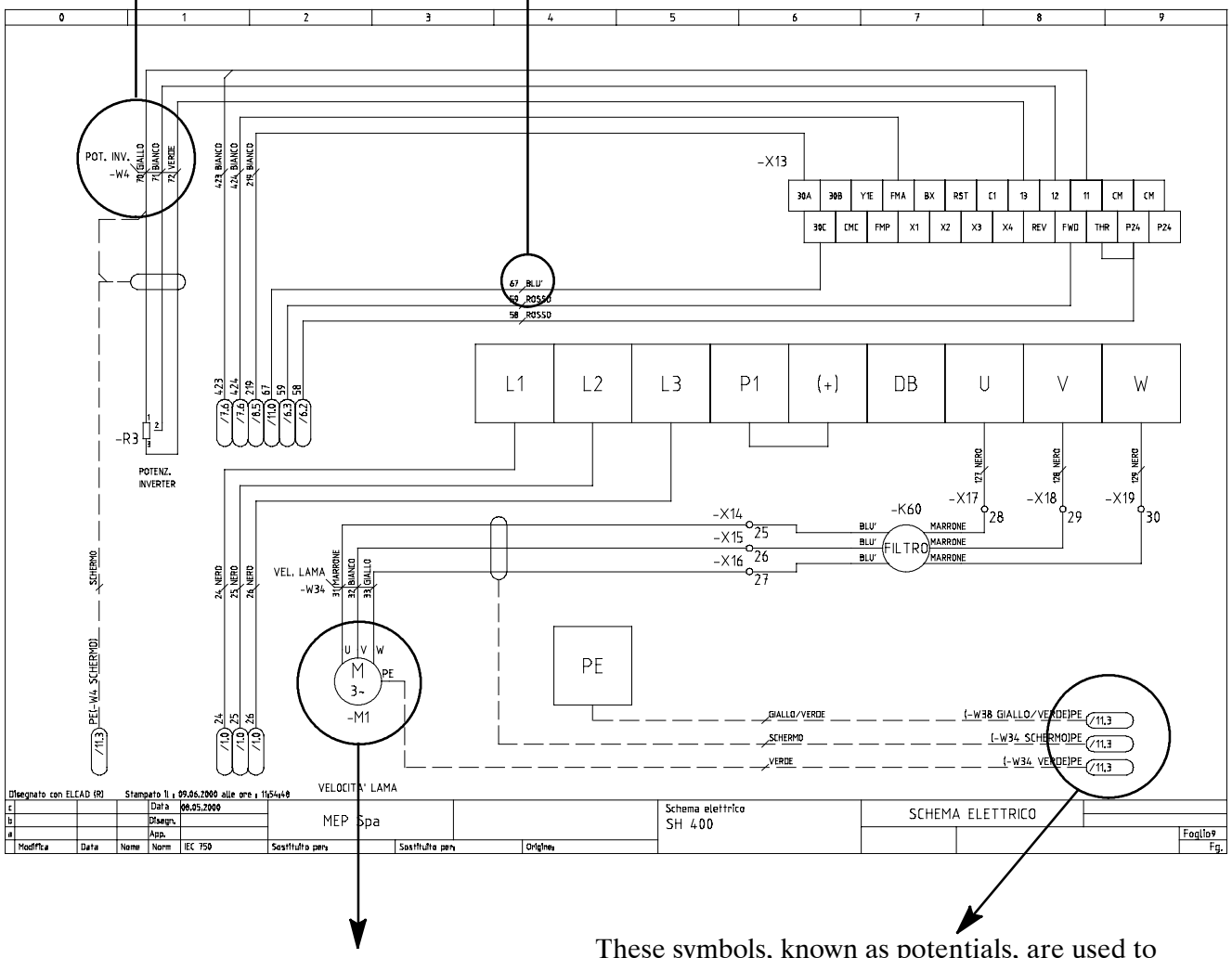
Foglio 9	
Fg.	

Indication of the page number

Each component in the wiring diagram is identified by a unique alphanumeric identification code, in compliance with regulations:

The wire is identified by the code –W4

This symbol identifies the wire with its relative number and colour



The motor is identified by the code –M1

These symbols, known as potentials, are used to provide page references: the first number indicates the page to be referred to, the second number, after the dot, identifies the column on that page; example /11.8 indicates that the wire continues on page no. 11 in column 8

The pages following the wiring diagrams contain the following lists:

1. components list (list of all components) and terminals list (list of all the terminals) with the following information:
   - in–house article code;
   - identification code;
   - reference, no. of the page and column on which it can be found;
   - description;
   - manufacturer.

ART. COD.	ID	PRES. REF	DESCRIPTION	MANUFACTURER
022.2151	-B1	/5.2	STRAIN GAUGE	DELTATEC

2. wires list (list of all wires) with the following information:
   - in−house article code;
   - identification code;
   - description;
   - section of wire (mm2);
   - colour of wire;
   - start: indicates the component (identification code and contact number) at which the wire starts;
   - end: indicates the component (identification code and contact number) at which the wire ends; e.g.

CODE	CABLE	DESCRIPTION	SECTION	NO.	COLOUR	START		END	
022.0141	-W7	RESET+EMER-GENZA	0.50	317	BIANCO	-S3	4	-K10	14

In this example, wire no. 317 white, identified as −W7, starts from contact no. 4 on component −S3, and ends at contact no. 14 on component −K10.
Enclosed below is Appendix D2 to European Standard EN 60204−1

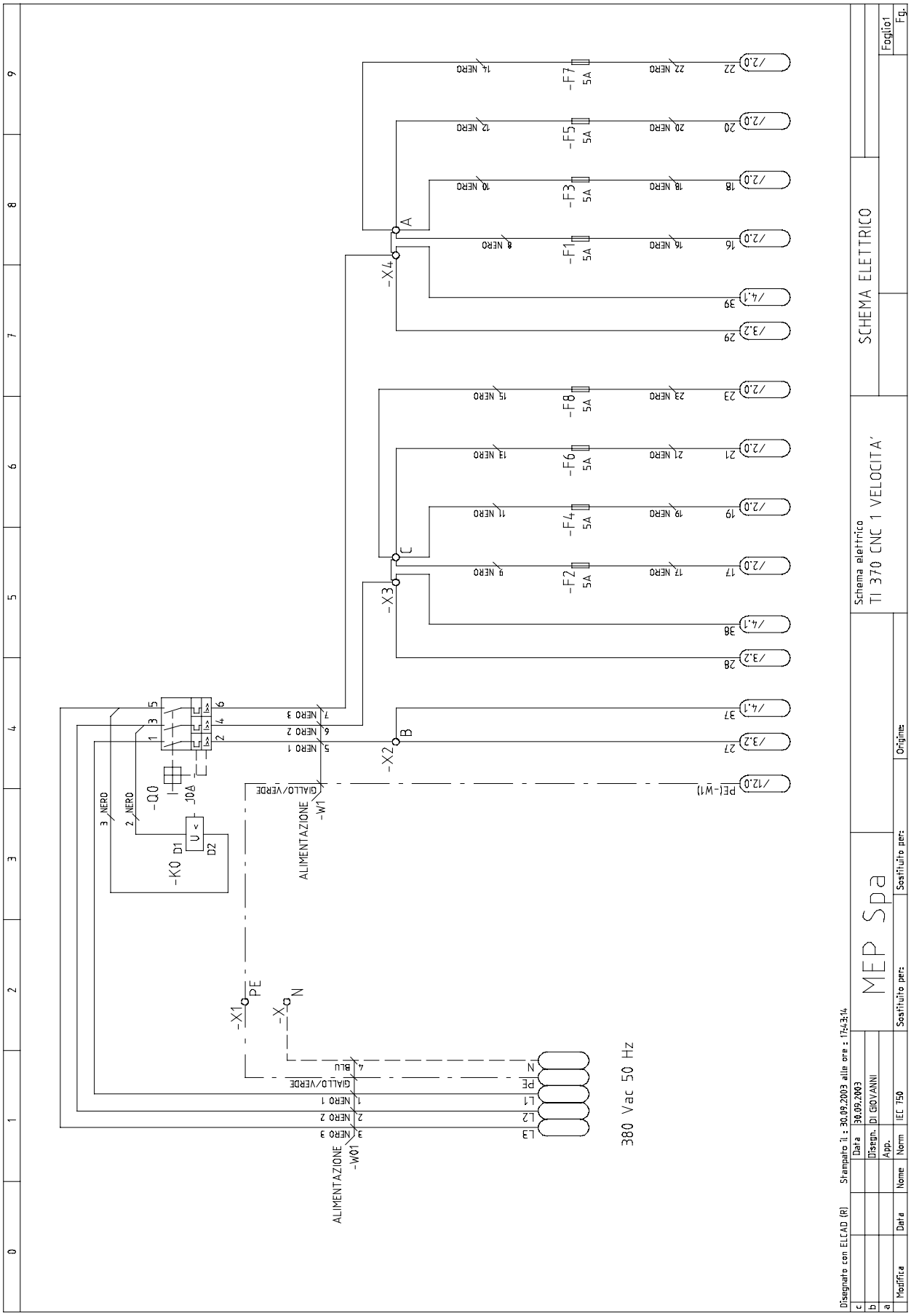
D2-Letter codes used to designate the type of component

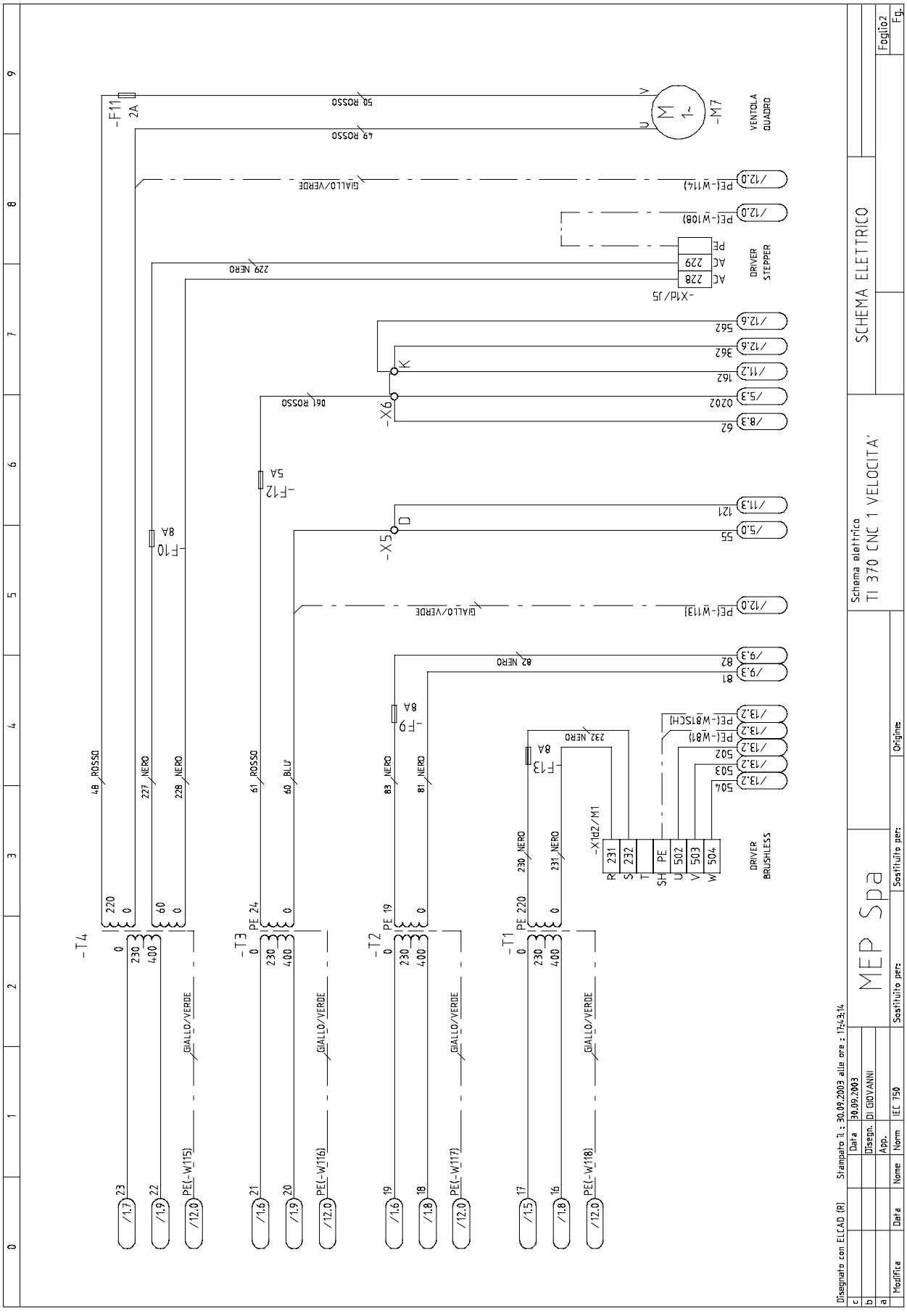
LETTER	TYPE OF COMPONENT	EXAMPLES	IDENTIFICATION OF THE APPLIANCE
A	Complex units	Laser Maser Regulator	A
B	Transducers converting a non electrical signal to an electrical signal and vice versa	Transistor amplifier IC amplifier Magnetic amplifier Valve amplifier Printed circuit board Drawer Rack	AD AJ AM AV AP AT AR
C	Capacitors		C
D	Binary operators, timing devices, storage devices	Digital integrated circuits and devices: Delay line Bistable element Monostable element Recorder Magnetic memory Tape or disk recorder	D
E	Various materials	Devices not specified in this table	E
F	Protective Devices	Lightning protectors Arrestors	F
		Instant action current threshold protector Delayed action current threshold protector Instant and delayed action current threshold protector Fuse Voltage threshold protector	FA FR FS FU FV

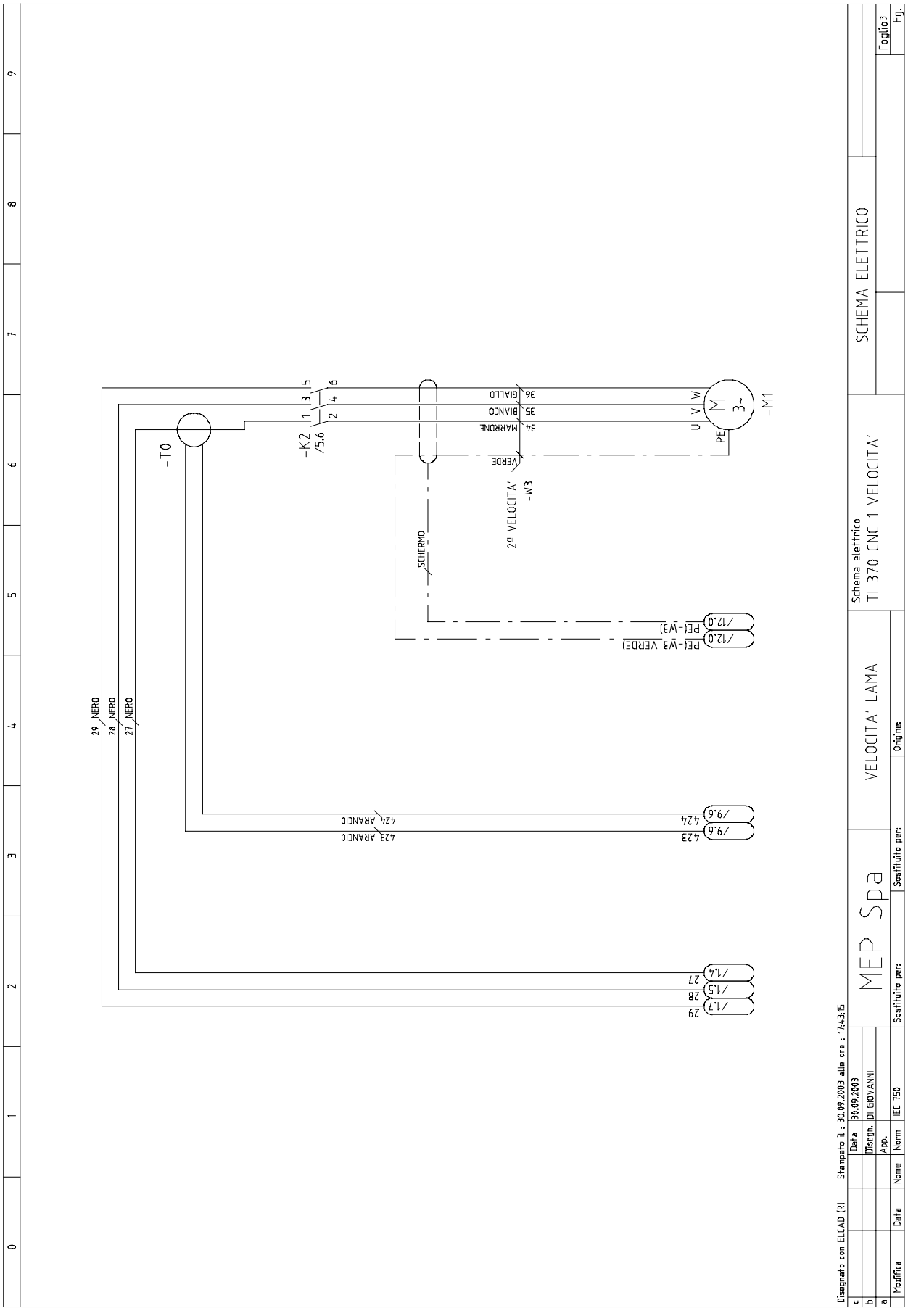
LETTER	TYPE OF COMPONENT	EXAMPLES	IDENTIFICATION OF THE APPLIANCE
G	Generators, feeders	Rotating generators Crystal oscillators	G
		Accumulator battery Rotating or static frequency converter Power feeder	GB GF GS
H	Signaling Devices	Buzzer Optical signal, indicator light device	HA HL
J			
K	Relays, Contactors	Instant all or nothing relays or instant contactors Bistable relays or interdependent contactors (All or nothing contactors with mechanical contact or permanent magnet etc.) Contactors Polarised relays Reed relays All or nothing timed relays (timers)	KA KL KM KP KR KT
L	Inductors, reactors	Inductor Stop coil Reactor	L
M	Motors		M
N	Analogue intgrated circuits	Operational amplifiers Hybrid analog/digital appliances	N
P	Measurement equipment, test devices	Indicator, recorder and integrator measurement devices Signal generators	P
Q	Power circuit switching appliances	Automatic switch Engine saver switch Knife switch	QF QM QS
R	Resistors	Fixed or variable resistor (rheostat)	R
S	Command or control devices	Selector or switch Button (including electronic proximity switch) Numerical all or nothing sensors (single step) of mechanical and electronic type: – Liquid level sensor – Pressure sensor Position sensor (including proximity) – Rotation sensor – Temperature probe	SA SB SL SP SQ SR ST
T	Transformers	Current transformer Control circuit supply transformer Power transformer Magnetic stabiliser Voltage transformer	TA TC TM TS TV

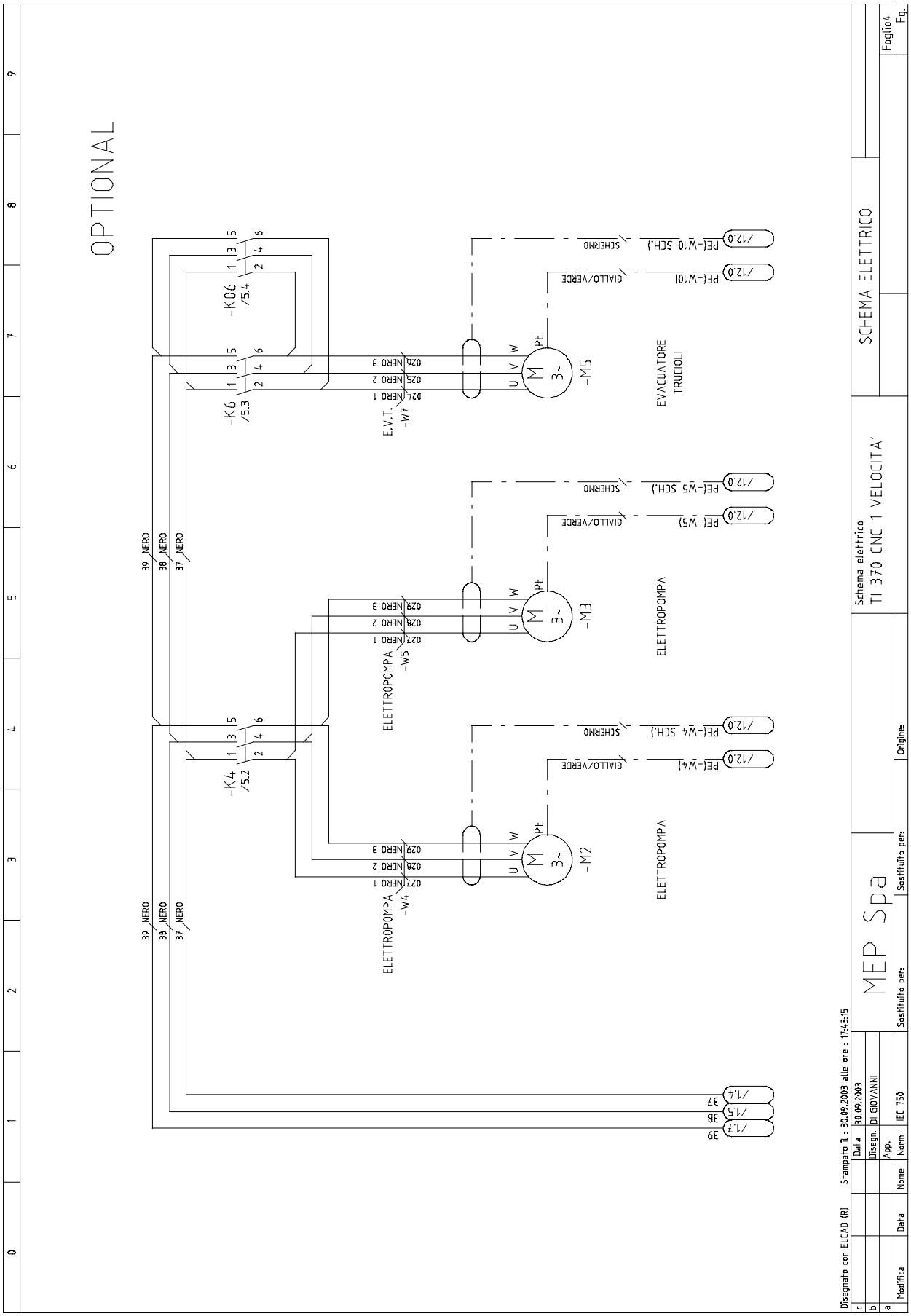
LETTER	TYPE OF COMPONENT	EXAMPLES	IDENTIFICATION OF THE APPLIANCE
U	Modulators, converters	Discriminator Demodulator Frequency converter Coder Converter Inverter Telegraphic repeater	U
V	Electronic pipes, semiconductors	Electronic pipe Gas discharge pipe Diode Transistor Thyristor	V
W	Transmission lines, wave guides, antennas	Conductor Cable Bar Wave guide Wave guide directional coupler Dipole Parabolic antenna	W
X	Terminals, sockets, plugs	Connector bar Test plug Plug Socket Terminal connector band	XB XJ XP XS XT
Y	Electrically operated mechanical appliances	Electromagnet Electromagnetic brake Electromagnetic clutch Magnetic table spindle Electromagnetic valve	YA YB YC YH YV
Z	Transformers, impedence adapters, equalizers, band limiters	Line equalizer Compresser Crystal filter	Z

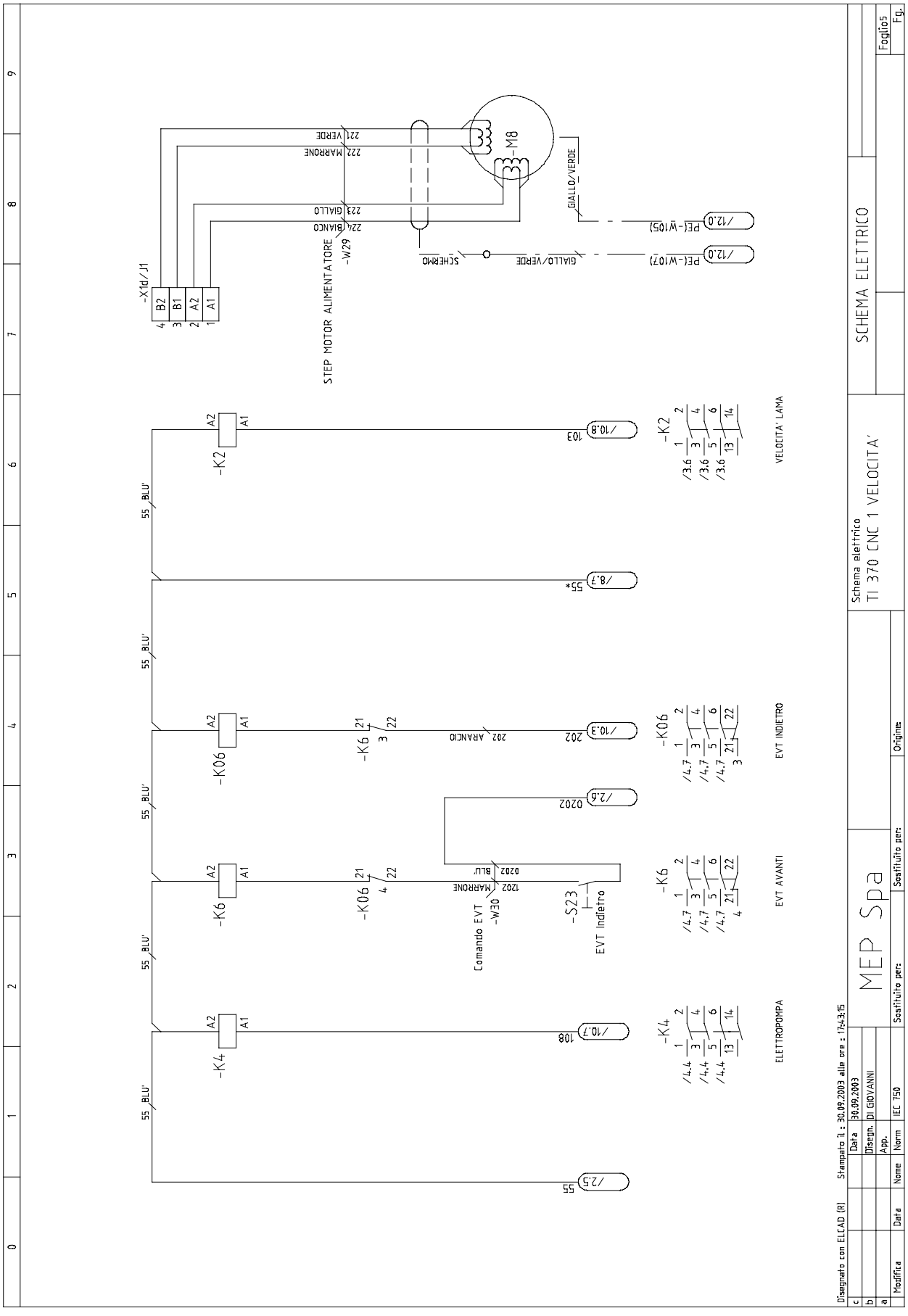
Standardised Wiring Diagrams TIGER 370 CNC-MR (IEC 750 EN 60204-1 Standard)

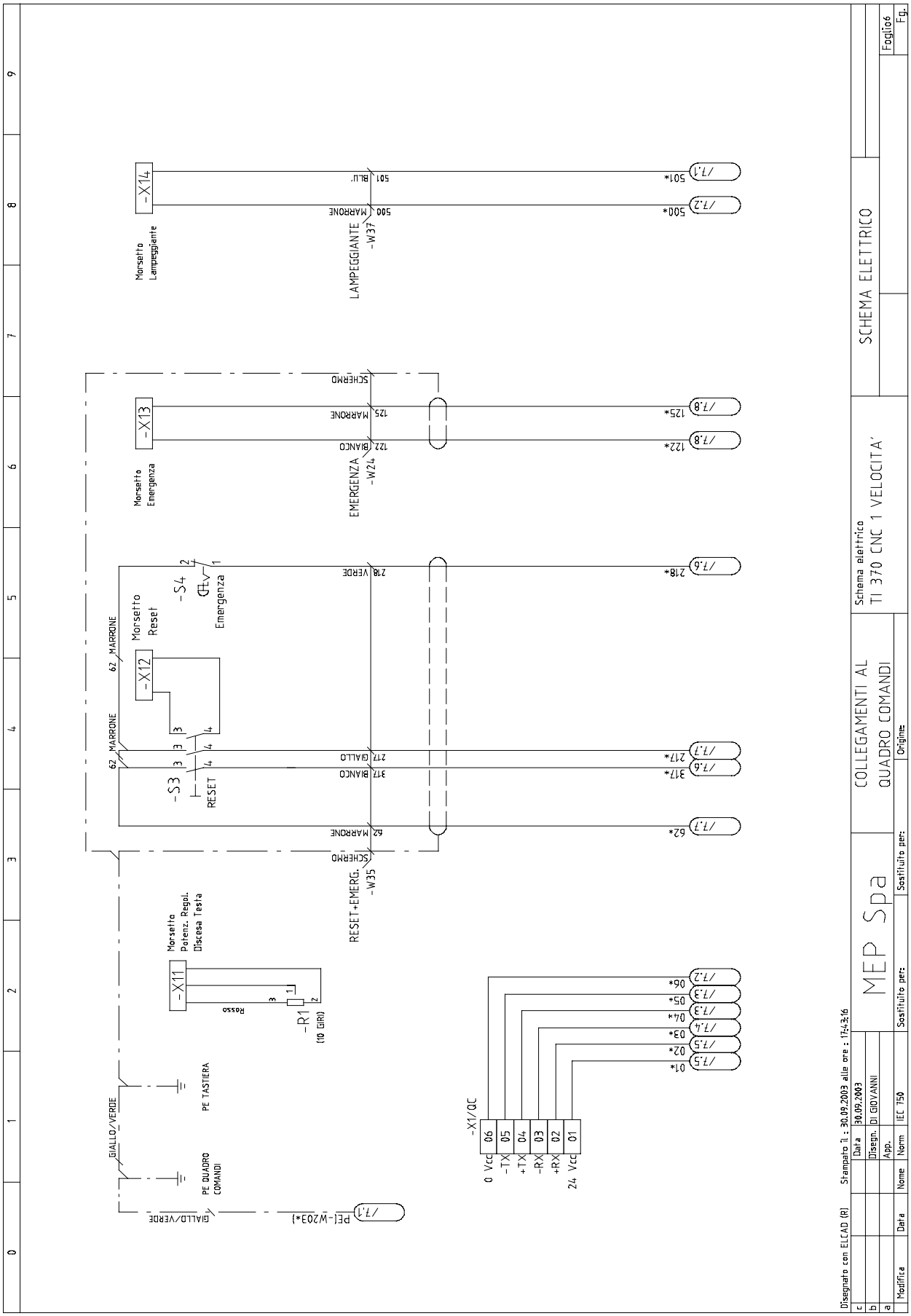


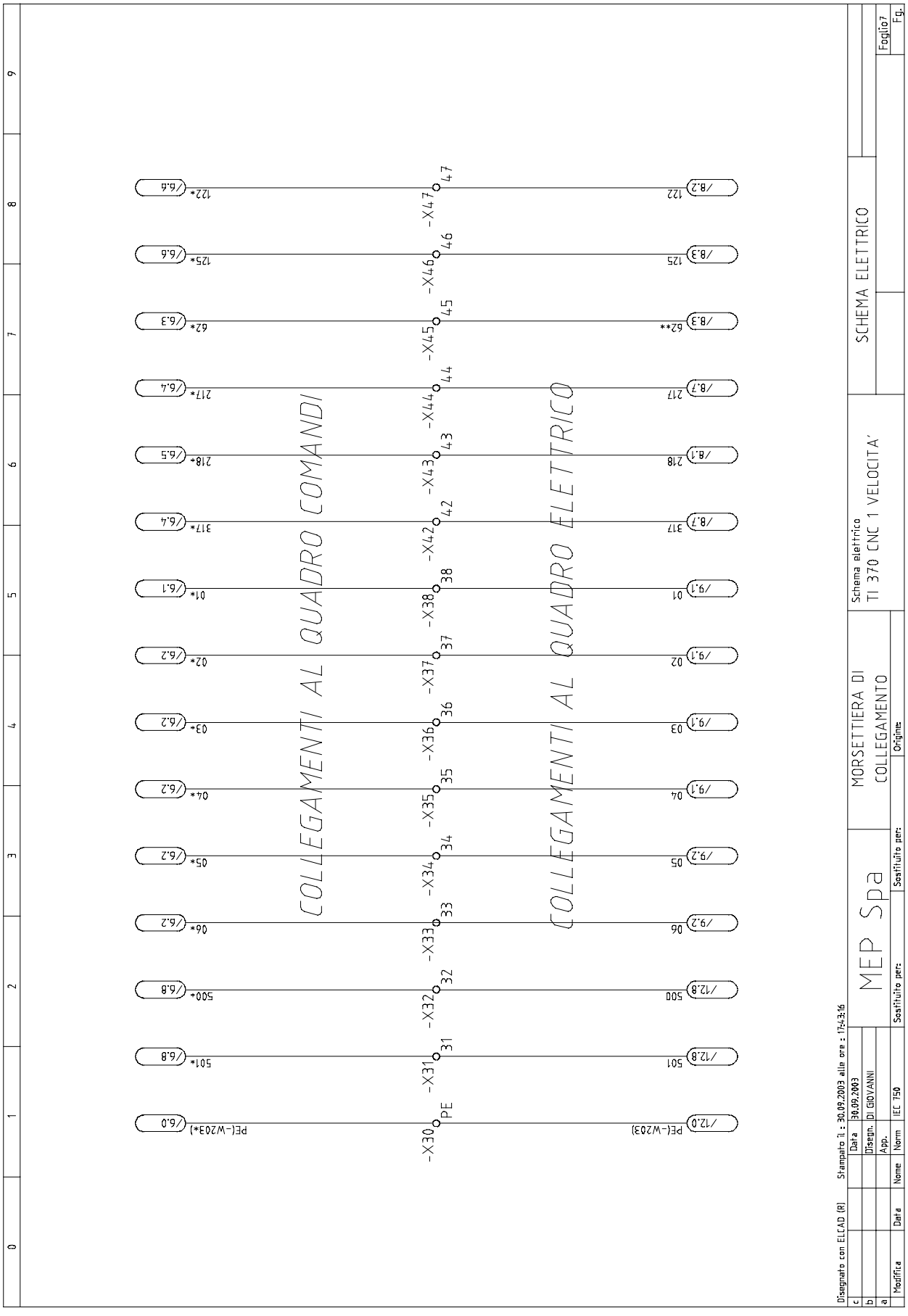

SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
MEP SpA
DRIVER STEPPER
DRIVER BRUSHLESS
VENTOLA QUADRO
-M7
-F11
-F10
-F12
-F9
-F13
-T4
-T3
-T2
-T1
-X5
-X6
-X1d/J5
-X1d2/M1
GIALLO/VERDE
ROSSO
NERO
BLU'

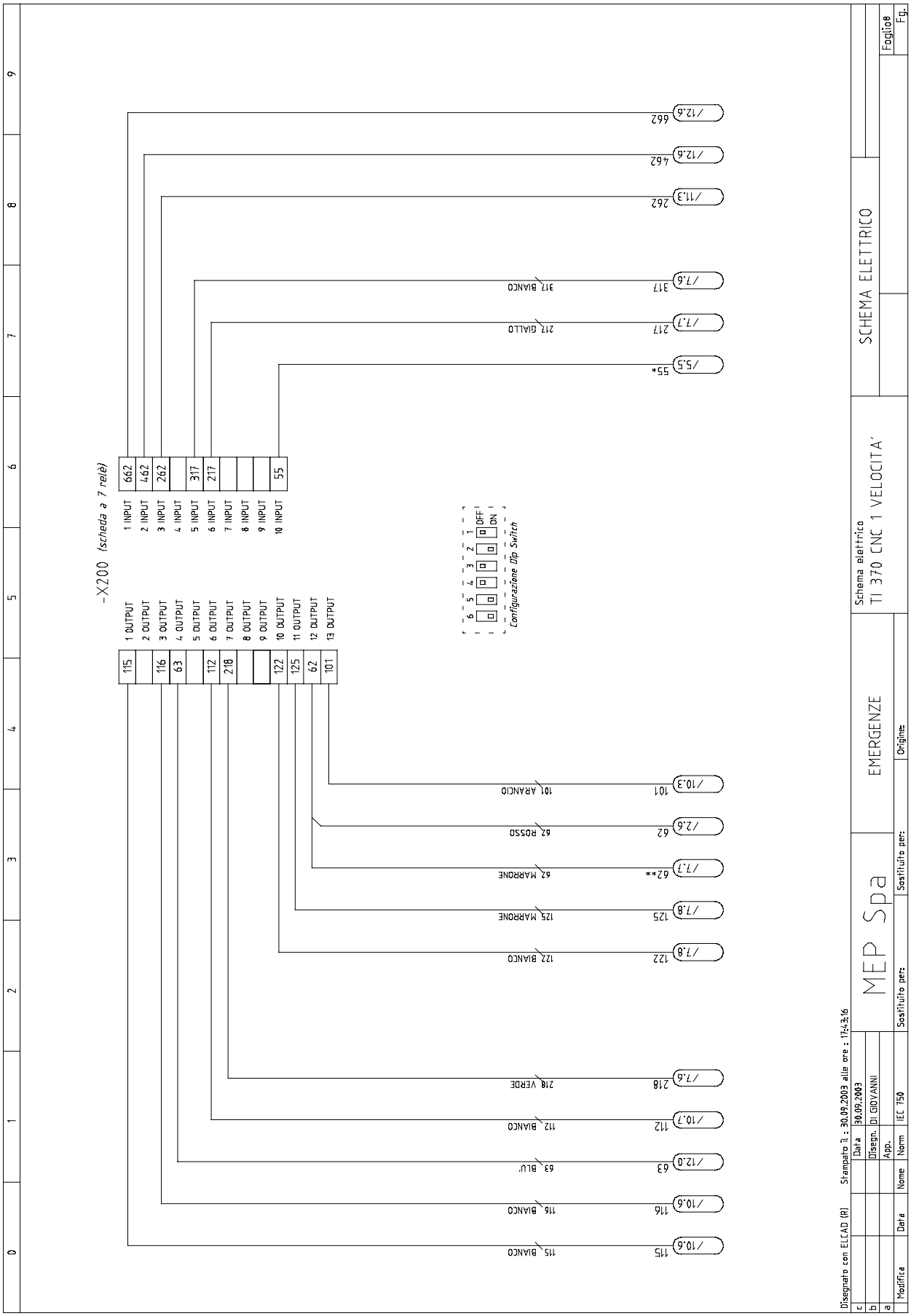

SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
VELOCITA' LAMA
MEP Spa
Foglio 3
Fg.
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alla ore : 17:43:15
Data 30.09.2003
Disegn. DI GIOVANNI
App.
Norm IEC 750
Sostituito per:
Origine
Modifica
Nome
Data
-M1
-K2
/5.6
-T0
-W3
2° VELOCITA'
SCHERMO
GIALLO
BIANCO
MARRONE
VERDE
PE
U V W
PE(-W3 VERDE)
PE(-W3)
/12.0
/9.6
/1.7
/1.5
/1.4
29 NERO
28 NERO
27 NERO
42A ARANCIO
42B ARANCIO
42A
42B
27
28
29

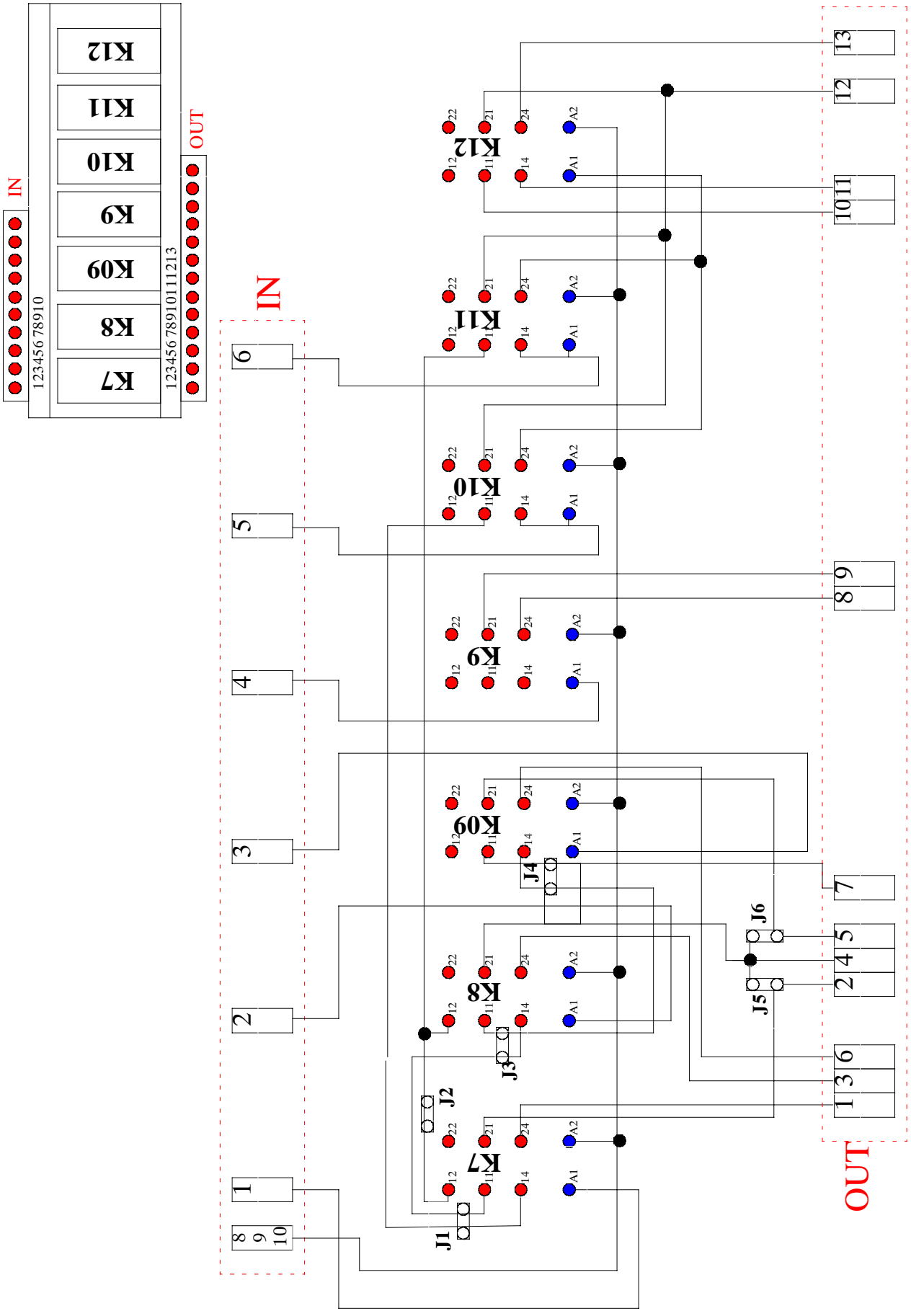

OPTIONAL
-K06 /5.4
-K6 /5.3
-K4 /5.2
-M5
-M3
-M2
EVACUATORE TRUCIOLI
ELETTROPOMPA
E.V.I. -W7
-W5
-W4
39 NERO
38 NERO
37 NERO
/12.0
/1.4
/1.5
/1.7
SCHERMO
GIALLO/VERDE
Schema elettrico
TI 370 CNC 1 VELOCITA'
SCHEMA ELETTRICO
MEP Spa
Foglio4
Fg.

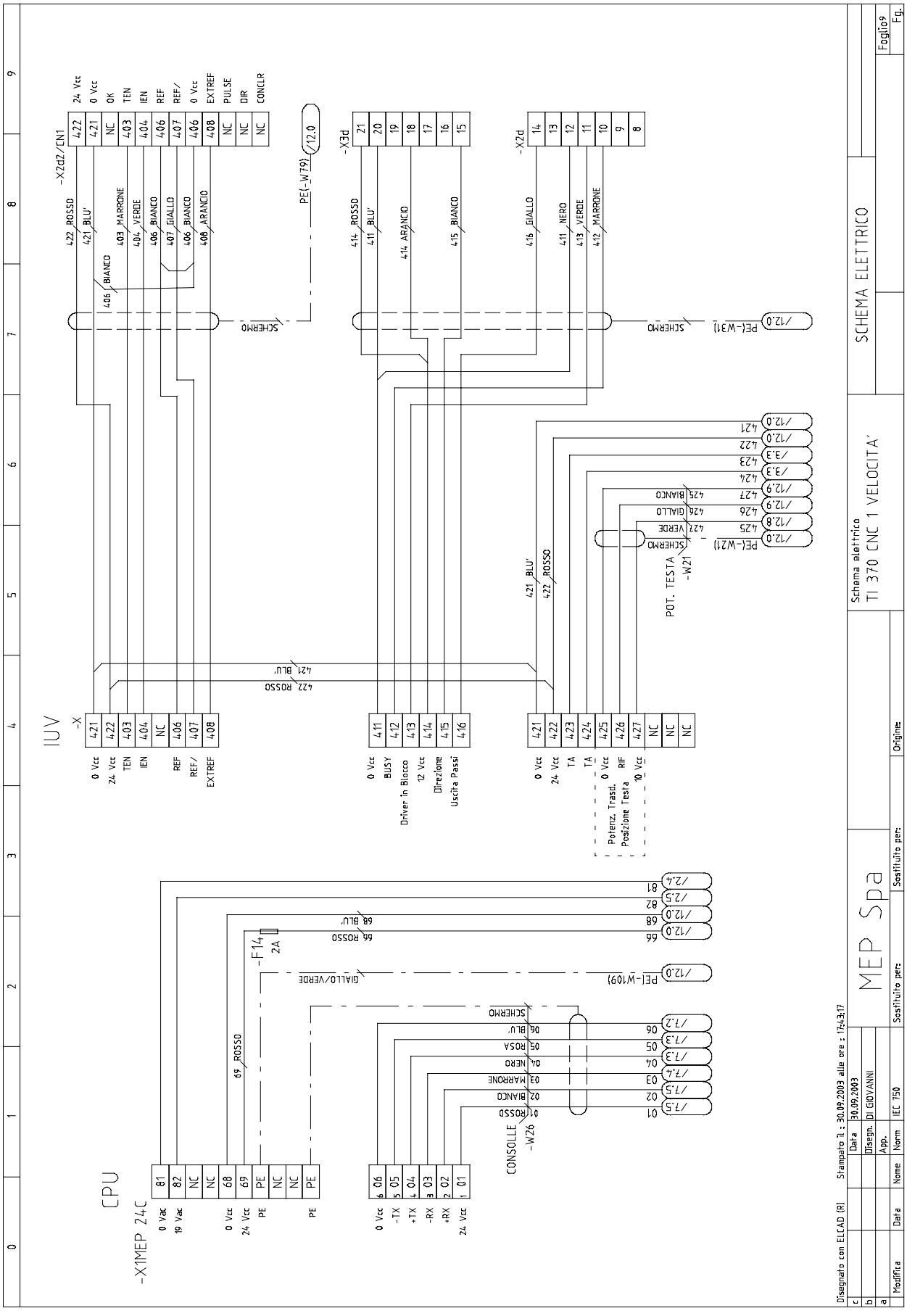

SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
MEP Spa
Foglio5
Fg.
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alle ore : 17:43:15
Data 30.09.2003
Disegn. DI GIOVANNI
App.
Norm IEC 750
Sostituito per:
Origine:
Modifica
Data
Nome
STEP MOTOR ALIMENTATORE
-X1d/J1
B2
B1
A2
A1
-W29
M8
VERDE
MARRONE
GIALLO
BIANCO
GIALLO/VERDE
SCHERMO
PE(-W105)
PE(-W107)
-K2
-K06
-K6
-K4
-S23
EVT Indietro
Comando EVT
-W30
VELOCITA' LAMA
EVT INDIETRO
EVT AVANTI
ELETTROPOMPA
ARANCIO
BLU'
55 BLU'
103
55*
202
108
55

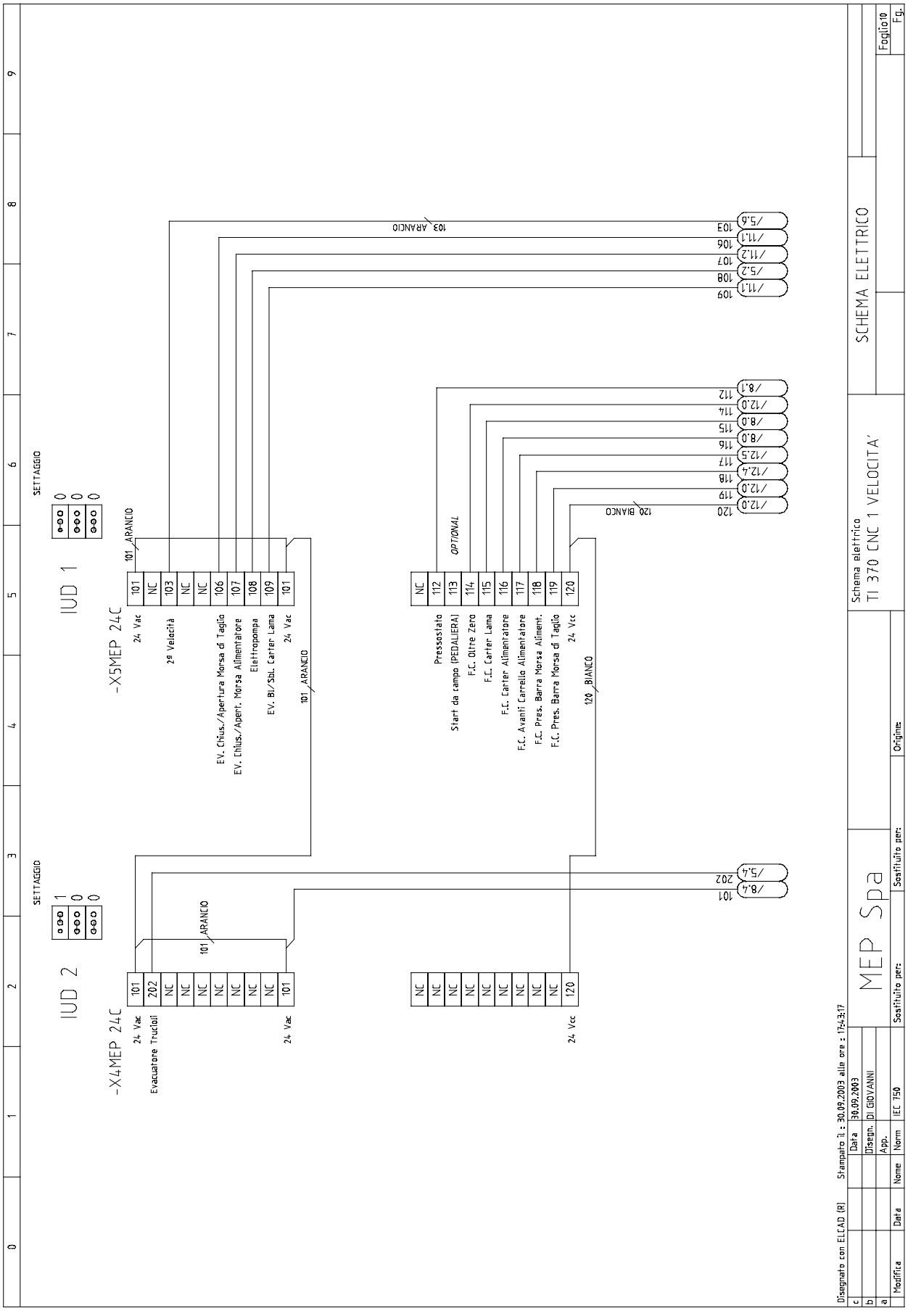

SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
COLLEGAMENTI AL
QUADRO COMANDI
MEP SpA
Morsetto Lampeggiante
-X14
LAMPEGGIANTE
-W37
Morsetto Emergenza
-X13
EMERGENZA
-W24
Morsetto Reset
-X12
-S4
Emergenza
-S3
RESET
RESET+EMERG.
-W35
Morsetto Potenz. Regol. Distesa Testa
-X11
-R1
(10 GIRI)
-X1/QC
0 Vcc
-TX
+TX
-RX
+RX
24 Vcc
PE TASTIERA
PE QUADRO COMANDI
GIALLO/VERDE
PE[-W203*]
501*
500*
125*
122*
218*
317*
217*
62*
01*
02*
03*
04*
05*
06*

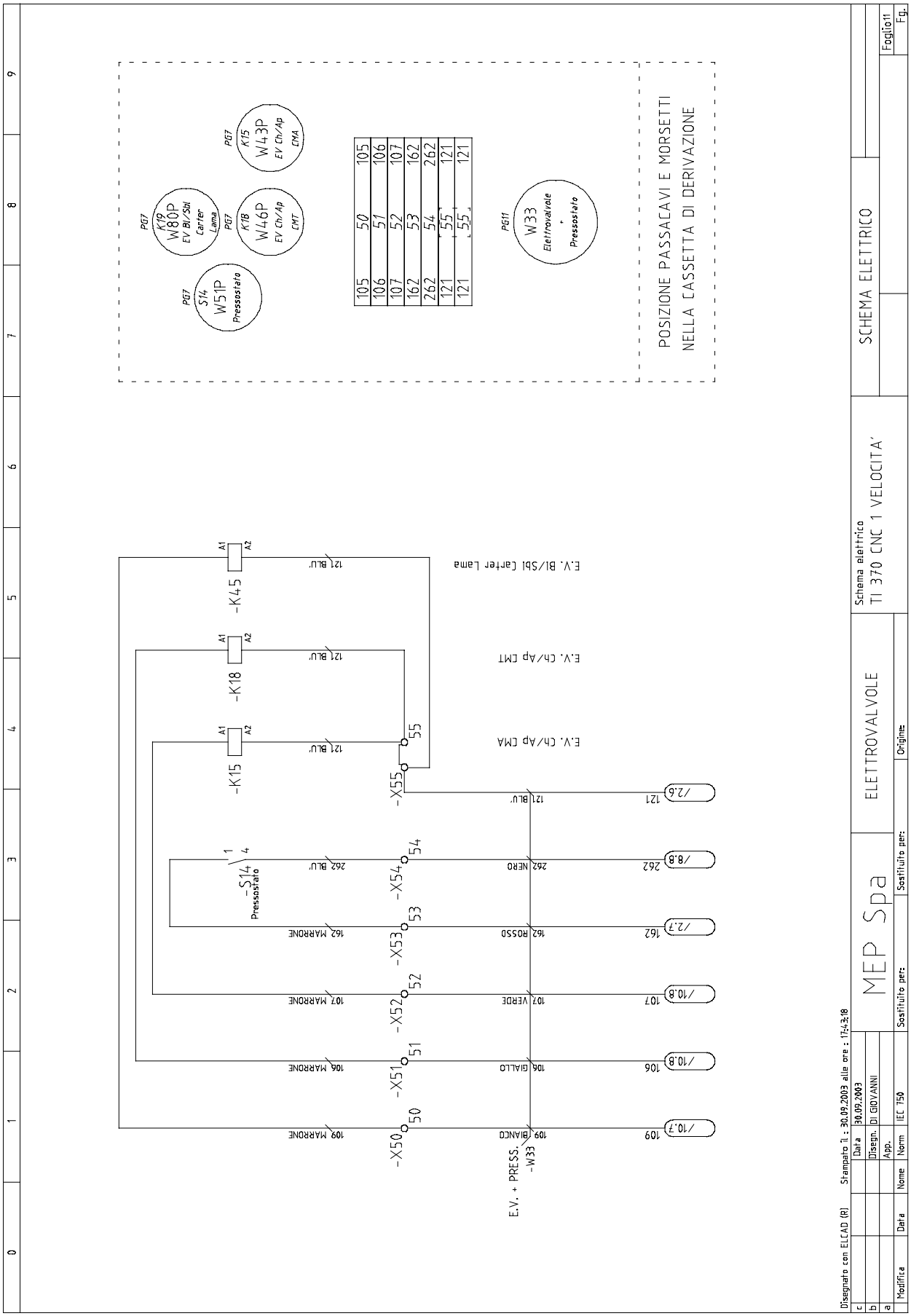

COLLEGAMENTI AL QUADRO COMANDI
COLLEGAMENTI AL QUADRO ELETTRICO
-X30
-X31
-X32
-X33
-X34
-X35
-X36
-X37
-X38
-X42
-X43
-X44
-X45
-X46
-X47
PE
PE(-W203)
PE(-W203*)
500
501
500*
501*
05
06
05*
06*
04
04*
03
03*
02
02*
01
01*
317
317*
218
218*
217
217*
62**
62*
125
125*
122
122*
MEP Spa
MORSETTIERA DI COLLEGAMENTO
Schema elettrico
TI 370 CNC 1 VELOCITA'
SCHEMA ELETTRICO
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alle ore : 17:43:16
Data 30.09.2003
Disegn. DI GIOVANNI
App.
Norm IEC 750
Modifica
Nome
Data
Sostituito per:
Origine:
Foglio 7
Fg.

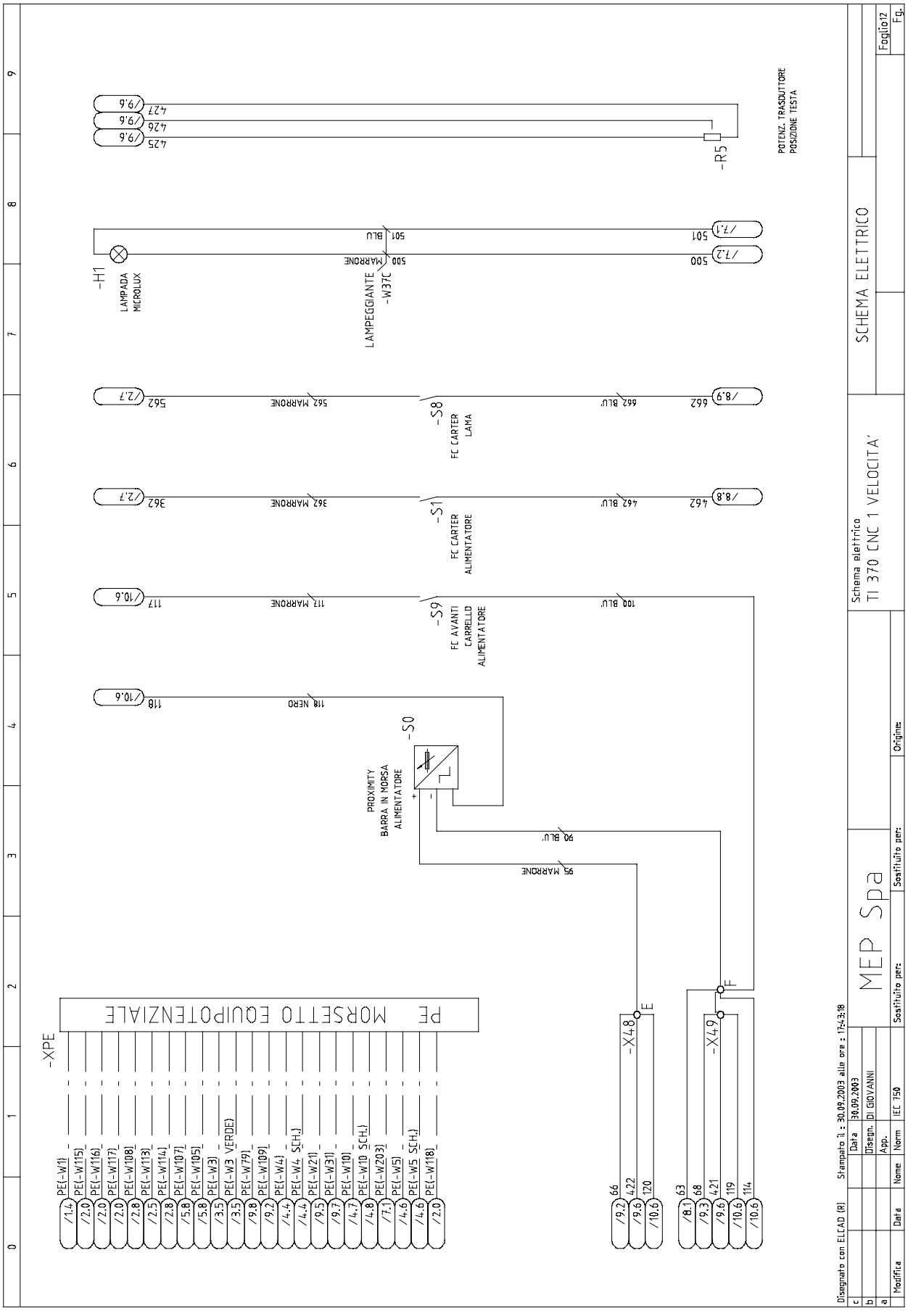

-X200 (scheda a 7 relè)
1 INPUT 662
2 INPUT 462
3 INPUT 262
4 INPUT 317
5 INPUT 217
6 INPUT
7 INPUT
8 INPUT
9 INPUT 55
10 INPUT
1 OUTPUT 115
2 OUTPUT
3 OUTPUT 116
4 OUTPUT 63
5 OUTPUT 112
6 OUTPUT 218
7 OUTPUT
8 OUTPUT
9 OUTPUT 122
10 OUTPUT 125
11 OUTPUT 62
12 OUTPUT 101
13 OUTPUT
Configurazione Dip Switch
OFF
ON
/12.6 662
/12.6 462
/11.3 262
/7.6 317 317 BIANCO
/7.7 217 217 GIALLO
/5.5 55*
/10.3 101 101 ARANCIO
/2.6 62 62 ROSSO
/7.7 62** 62 MARRONE
/7.8 125 125 MARRONE
/7.8 122 122 BIANCO
/7.6 218 218 VERDE
/10.7 112 112 BIANCO
/12.0 63 63 BLU'
/10.6 116 116 BIANCO
/10.6 115 115 BIANCO
Disegnato con ELCAD (R) Stampato il : 30.09.2003 alle ore : 17:43:16
Modifica Data Nome
a
b
c
Data 30.09.2003
Disegn. DI GIOVANNI
App.
Norm IEC 750
Sostituito per:
Sostituito per:
MEP SpA
EMERGENZE
Origine:
Schema elettrico
TI 370 CNC 1 VELOCITA'
SCHEMA ELETTRICO
Foglio8
Fg.

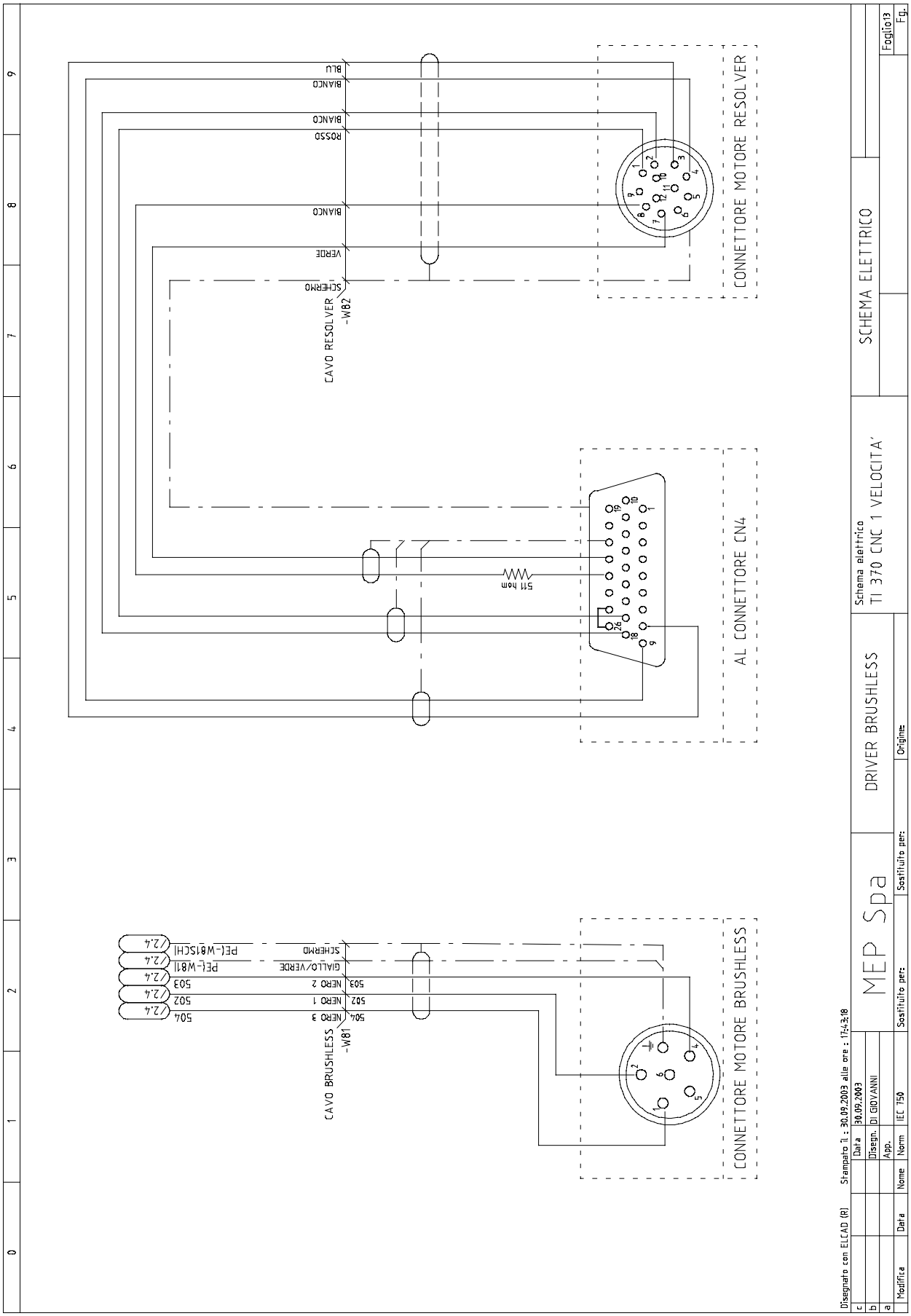

IN
OUT
K12
K11
K10
K9
K09
K8
K7
123456 78910
123456 78910111213
J1
J2
J3
J4
J5
J6

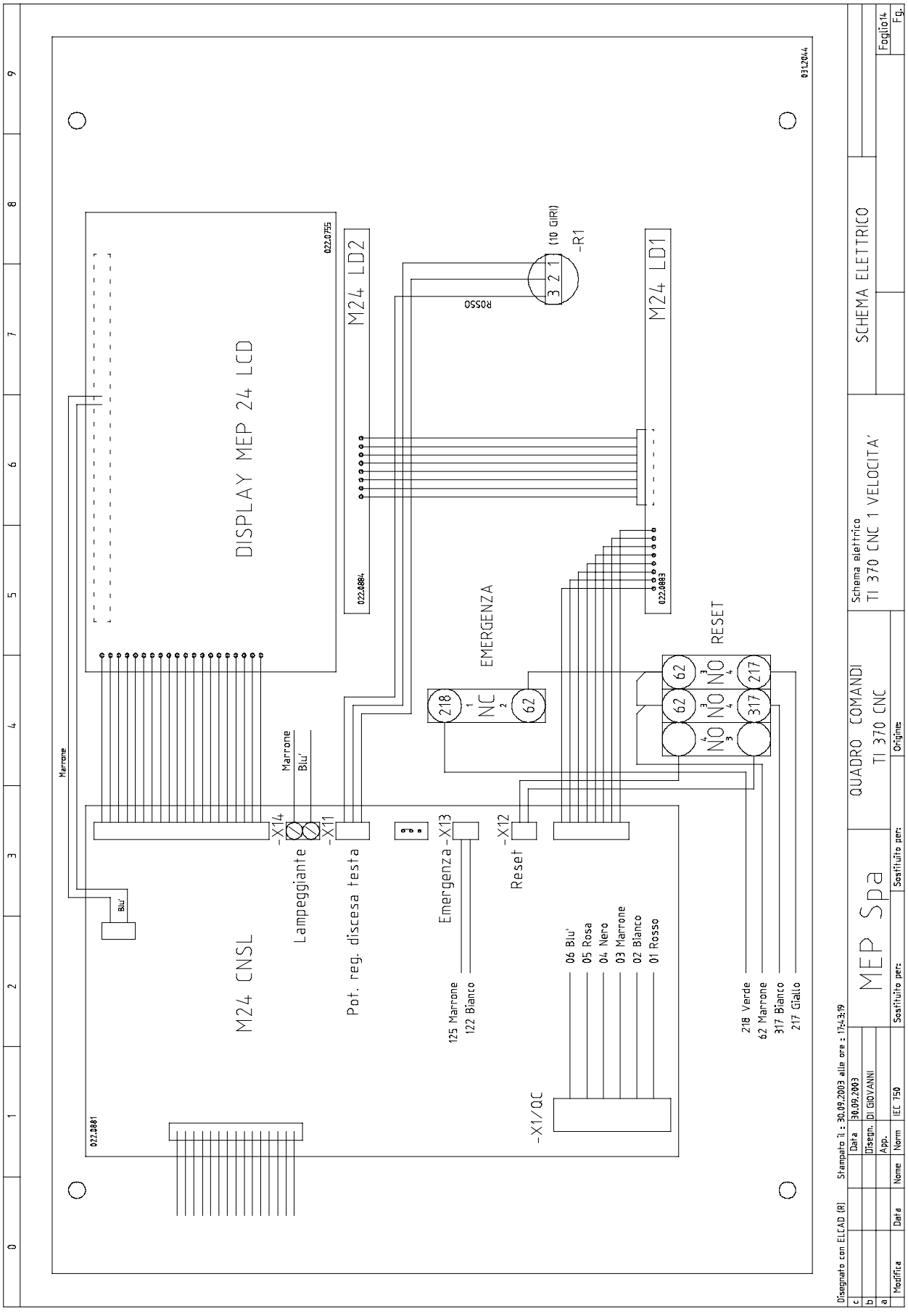

SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
MEP Spa
IUV
-X
-X2d2/CN1
-X3d
-X2d
-X1MEP 24C
CPU
POT. TESTA
-W21
CONSOLLE
-W26
-F14
2A
PE(-W79)
PE(-W31)
PE(-W21)
PE(-W109)
SCHERMO
0 Vcc
24 Vcc
TEN
IEN
REF
REF/
EXTREF
BUSY
Driver in Blocco
12 Vcc
Direzione
Uscita Passi
TA
Potenz. Trasd.
Posizione Testa
RIF
10 Vcc
-TX
+TX
-RX
+RX
OK
PULSE
DIR
CONCLR
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alle ore : 17:43:17
Data
Disegn.
App.
Norm
IEC 750
Nome
Modifica
Sostituito per:
Sostituito per:
Origine:
Foglio9
Fg.


SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
MEP Spa
Foglio 10
Fg.
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alle ore : 17:43:17
Data 30.09.2003
Disegn. DI GIOVANNI
App.
Norm IEC 750
Origine
Sostituito per:
Modifica
Nome
-X4MEP 24C
-X5MEP 24C
IUD 1
IUD 2
SETTAGGIO
24 Vac
24 Vcc
Evacuatore Trucioli
2ª Velocità
EV. Chius./Apertura Morsa di Taglio
EV. Chius./Apert. Morsa Alimentatore
Elettropompa
EV. Bl/Sbl. Carter Lama
Pressostato
Start da rampa (PEDALIERA)
OPTIONAL
F.C. Oltre Zero
F.C. Carter Lama
F.C. Carter Alimentatore
F.C. Avanti Carrello Alimentatore
F.C. Pres. Barra Morsa Aliment.
F.C. Pres. Barra Morsa di Taglio
ARANCIO
BIANCO


POSIZIONE PASSACAVI E MORSETTI
NELLA CASSETTA DI DERIVAZIONE
PG7 S14 W51P Pressostato
PG7 K19 W80P EV Bl/Sbl Carter Lama
PG7 K18 W46P EV Ch/Ap CMT
PG7 K15 W43P EV Ch/Ap CMA
PG11 W33 Elettrovalvole + Pressostato
105 50 105
106 51 106
107 52 107
162 53 162
262 54 262
121 55 121
121 55 121
E.V. Bl/Sbl Carter Lama
E.V. Ch/Ap CMT
E.V. Ch/Ap CMA
-K45
-K18
-K15
-S14 Pressostato
-X55
-X54
-X53
-X52
-X51
-X50
-W33
E.V. + PRESS.
121 BLU'
262 BLU'
162 MARRONE
162 ROSSO
262 NERO
107 MARRONE
107 VERDE
106 MARRONE
106 GIALLO
109 MARRONE
109 BIANCO
/2.6
/8.8
/2.7
/10.8
/10.8
/10.7
Schema elettrico
TI 370 CNC 1 VELOCITA'
SCHEMA ELETTRICO
ELETTROVALVOLE
MEP Spa
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alle ore : 17:43:18
Data 30.09.2003
Disegn. DI GIOVANNI
App.
Norm IEC 750
Nome
Data
Modifica
Sostituito per:
Origine:
Fogli 11
Fg.


SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
MEP Spa
Foglio 12
-R5
POTENZ. TRASDUTTORE POSIZIONE TESTA
-H1
LAMPADA MICROLUX
LAMPEGGIANTE -W37
-S8
FC CARTER LAMA
-S1
FC CARTER ALIMENTATORE
-S9
FC AVANTI CARRELLO ALIMENTATORE
-S0
PROXIMITY BARRA IN MORSA ALIMENTATORE
-XPE
PE MORSETTO EQUIPOTENZIALE
-X48
-X49


CONNETTORE MOTORE RESOLVER
CAVO RESOLVER -W82
SCHERMO
VERDE
BIANCO
ROSSO
BIANCO
BIANCO
BLU
AL CONNETTORE CN4
511 ohm
CONNETTORE MOTORE BRUSHLESS
CAVO BRUSHLESS -W81
SCHERMO
GIALLO/VERDE
NERO 2
NERO 1
NERO 3
503
502
504
PE(-W81SCHI)
PE(-W81)
2,4
MEP Spa
DRIVER BRUSHLESS
SCHEMA ELETTRICO
Schema elettrico
TI 370 CNC 1 VELOCITA'
Foglio13
Fg.
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alle ore : 17:43:18
Modifica
Data
Nome
Norm
IEC 750
Disegn.
DI GIOVANNI
App.
Sostituito per:
Sostituito per:
Origine:


DISPLAY MEP 24 LCD
M24 LD2
M24 LD1
M24 CNSL
022.0755
022.0884
022.0883
022.0881
831.2944
R550
(10 GIRI)
-R1
EMERGENZA
RESET
NC
NO
Marrone
Blu'
-X14
-X11
-X13
-X12
-X1/QC
Lampeggiante
Pot. reg. discesa testa
Emergenza
Reset
125 Marrone
122 Bianco
06 Blu'
05 Rosa
04 Nero
03 Marrone
02 Bianco
01 Rosso
218 Verde
62 Marrone
317 Bianco
217 Giallo
MEP Spa
QUADRO COMANDI
TI 370 CNC
Schema elettrico
TI 370 CNC 1 VELOCITA'
SCHEMA ELETTRICO
Foglio 14
Fg.
Origine:
Sostituito per:
Data
Disegn.
App.
Norm
Nome
Modifica
30.09.2003
DI GIOVANNI
IEC 750
Disegnato con ELCAD (R)
Stampato il : 30.09.2003 alle ore : 17:43:19

List of cables

Code	Cable	Description	Ø	No.	Colour	Start		End	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	416	GIALLO	-X2D	14	-X2MEP24C	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	413	VERDE	-X2D	11	-X2MEP24C	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	412	MARRONE	-X2D	10	-X2MEP24C	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22		SCHERMO	-SCH	SCH	-XPE	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	411	GRIGIO	-X2D	12	-X2MEP24C	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	414	ROSA	-X3D	18	-X2MEP24C	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	414	ROSSO	-X3D	21	-X2MEP24C	
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	411	BLU'	-X3D	20	-X2MEP24C	
022.0141	-W28	STEP MOTOR CILINDRO	0.50	403	VERDE	-M9	B	-X2MEP24C	
022.0141	-W28	STEP MOTOR CILINDRO	0.50	405	GIALLO	-M9	A	-X2MEP24C	
022.0141	-W28	STEP MOTOR CILINDRO	0.50		SCHERMO	-XPE		-SCH	SCH
022.0892	-W31	COLL. DRIVER/MEP 24C	0.22	415	BIANCO	-X3D	15	-X2MEP24C	
022.0141	-W28	STEP MOTOR CILINDRO	0.50	402	MARRONE	-M9	B	-X2MEP24C	
022.0141	-W21	POTENZ. TRASDUTTORE POSIZ.TESTA	0.50		SCHERMO	-XPE		-SCH	SCH
022.0141	-W21	POTENZ. TRASDUTTORE POSIZ.TESTA	0.50	426	GIALLO	-R5		-X2MEP24C	
022.0141	-W21	POTENZ. TRASDUTTORE POSIZ.TESTA	0.50	427	VERDE	-R5		-X2MEP24C	
022.0141	-W21	POTENZ. TRASDUTTORE POSIZ.TESTA	0.50		MARRONE				
022.0141	-W21	POTENZ. TRASDUTTORE POSIZ.TESTA	0.50	425	BIANCO	-R5		-X2MEP24C	
022.0158	-W1	ALIMENTAZIONE	1.50	3	NERO	-Q0	5		
022.0158	-W1	ALIMENTAZIONE	1.50		GIALLO/VERDE	-XPE			
022.0141	-W28	STEP MOTOR CILINDRO	0.50	404	BIANCO	-M9	A	-X2MEP24C	
022.0158	-W1	ALIMENTAZIONE	1.50	2	NERO	-Q0	3		
022.0158	-W1	ALIMENTAZIONE	1.50	4	BLU'	-X1	N		
022.0158	-W1	ALIMENTAZIONE	1.50	1	MARRONE	-Q0	1		
022.0141	-W25/CB	RESET+EMERGENZA CB	0.50	02	BIANCO	-S4	2	-X2F/CB	02
022.0141	-W25/CB	RESET+EMERGENZA CB	0.50	01	MARRONE	-S4	1	-X2F/CB	01
022.0141	-W25/CB	RESET+EMERGENZA CB	0.50	03	VERDE	-X2F/CB	03	-S3	3
022.0141	-W25/CB	RESET+EMERGENZA CB	0.50	04	GIALLO	-X2F/CB	04	-S3	4
022.0141	-W25/CB	RESET+EMERGENZA CB	0.50		SCHERMO	-SCH	SCH	-XPE	
022.0145	-W26	CONSOLLE	0.20	02	BIANCO	-X1MEP 24C		-X1 Q.C.	02
022.0145	-W26	CONSOLLE	0.20	03	MARRONE	-X1MEP 24C		-X1 Q.C.	03
022.0145	-W26	CONSOLLE	0.20		VERDE				
022.0145	-W26	CONSOLLE	0.20		GIALLO				
022.0145	-W26	CONSOLLE	0.20	04	NERO	-X1MEP 24C		-X1 Q.C.	04
022.0145	-W26	CONSOLLE	0.20	05	ROSA	-X1MEP 24C		-X1 Q.C.	05
022.0145	-W26	CONSOLLE	0.20	06	BLU'	-X1MEP 24C		-X1 Q.C.	06
022.0145	-W26	CONSOLLE	0.20	01	ROSSO	-X1MEP 24C		-X1 Q.C.	01
022.0145	-W26	CONSOLLE	0.20		SCHERMO	-SCH	SCH	-X1MEP24C	
022.0141	-W23	POT. INV.	0.50	71	BIANCO	-X100	AI1	-R3	
022.0141	-W23	POT. INV.	0.50		MARRONE				
022.0141	-W23	POT. INV.	0.50	72	VERDE	-X100	+10	-R3	
022.0141	-W23	POT. INV.	0.50	70	GIALLO	-X100	COM	-R3	

Code	Cable	Description	Ø	No.	Colour	Start		End	
022.0141	-W23	POT. INV.	0.50		SCHERMO	-SCH	SCH	-XPE	
022.0141	-W25	RESET+EMERGENZA	0.50	317	BIANCO	-S3	4	-K10	14
022.0141	-W25	RESET+EMERGENZA	0.50	62	MARRONE	-S3	3	-K10	24
022.0141	-W25	RESET+EMERGENZA	0.50	218	VERDE	-S4	1	-X99	H
022.0141	-W25	RESET+EMERGENZA	0.50	217	GIALLO	-S3	4	-K11	14
022.0141	-W25	RESET+EMERGENZA	0.50		SCHERMO	-XPE		-SCH	SCH
022.0141	-W24	EMERGENZA	0.50	122	BIANCO	-K12	11	-X13	
022.0141	-W24	EMERGENZA	0.50	125	MARRONE	-K12	14	-X13	
022.0141	-W24	EMERGENZA	0.50		VERDE				
022.0141	-W24	EMERGENZA	0.50		GIALLO				
022.0141	-W24	EMERGENZA	0.50		SCHERMO	-XPE		-SCH	SCH
022.0160	-W60	FINE CORSA AVANTI CAR-RELLO ALIM.	0.50	117	MARRONE	-X5MEP 24C		-S9	
022.0160	-W60	FINE CORSA AVANTI CAR-RELLO ALIM.	0.50	100	BLU'	-X49	F	-S9	
022.0160	-W59	F.C.PRES.BARRA IN MORSA ALIM.	0.50	118	MARRONE	-X5MEP 24C		-S10	
022.0160	-W59	F.C.PRES.BARRA IN MORSA ALIM.	0.50	99	BLU'	-X49	F	-S10	
022.0160	-W39	E.V. RIGENERATRICE	0.50	109	MARRONE	-X5MEP 24C		-K21	A1
022.0160	-W39	E.V. RIGENERATRICE	0.50	239	BLU'	-X5	D	-K21	A2
022.0160	-W56	F.C. BARRA PROTEZIONE	0.50	0462	MARRONE	-X47	M	-S1	
022.0160	-W56	F.C. BARRA PROTEZIONE	0.50	462	BLU'	-K8	A1	-S1	
022.0160	-W57	F.C. BARRA PROT. LATERALE	0.50	362	MARRONE	-S2		-X6	K
022.0160	-W57	F.C. BARRA PROT. LATERALE	0.50	0362	BLU'	-X47	M	-S2	
022.0141	-W4	ELETTROPOMPA	0.50	028	BIANCO	-M2	V	-K4	4
022.0141	-W4	ELETTROPOMPA	0.50	027	MARRONE	-M2	U	-K4	2
022.0141	-W4	ELETTROPOMPA	0.50		VERDE	-XPE		-M2	PE
022.0141	-W4	ELETTROPOMPA	0.50	029	GIALLO	-M2	W	-K4	6
022.0141	-W4	ELETTROPOMPA	0.50		SCHERMO	-SCH	SCH	-XPE	
022.0141	-W7	E.V.T.	0.50	025	BIANCO	-M5	V	-K6	4
022.0141	-W7	E.V.T.	0.50	024	MARRONE	-M5	U	-K6	2
022.0141	-W7	E.V.T.	0.50		VERDE	-XPE		-M5	PE
022.0141	-W7	E.V.T.	0.50	026	GIALLO	-M5	W	-K6	6
022.0141	-W7	E.V.T.	0.50		SCHERMO	-SCH	SCH	-XPE	
022.0143	-W2	1¦ VELOCITA'	1.50	32	BIANCO	-M1	V2	-K1	4
022.0143	-W2	1¦ VELOCITA'	1.50	31	MARRONE	-M1	U2	-K1	2
022.0143	-W2	1¦ VELOCITA'	1.50		VERDE	-XPE		-M1	PE
022.0143	-W2	1¦ VELOCITA'	1.50	33	GIALLO	-M1	W2	-K1	6
022.0143	-W2	1¦ VELOCITA'	1.50		SCHERMO	-XPE		-SCH	SCH
022.0143	-W3	2¦ VELOCITA'	1.50	35	BIANCO	-M1	V1	-K2	4
022.0143	-W3	2¦ VELOCITA'	1.50	34	MARRONE	-M1	U1	-K2	2
022.0143	-W3	2¦ VELOCITA'	1.50		VERDE	-XPE		-M1	PE
022.0143	-W3	2¦ VELOCITA'	1.50	36	GIALLO	-M1	W1	-K2	6
022.0143	-W3	2¦ VELOCITA'	1.50		SCHERMO	-XPE		-SCH	SCH
022.0160	-W58	F.C. PRES. BARRA MORSA DI TAGLIO	0.50	119	MARRONE	-X5MEP 24C		-S11	
022.0160	-W58	F.C. PRES. BARRA MORSA DI TAGLIO	0.50	0119	BLU'	-S11		-X49	F
022.0160	-W69	F.C. AVANZAMENTO BARRA	0.50	314	MARRONE	-X3MEP 24C		-S26	

Code	Cable	Description	Ø	No.	Colour	Start		End	
022.0160	-W69	F.C. AVANZAMENTO BARRA	0.50	0314	BLU'	-S26		-X49	F
022.0165	-W33	E.V.+ PRESS.	0.50	105	BIANCO	-X50	50	-X5MEP24C	
022.0165	-W33	E.V.+ PRESS.	0.50	107	VERDE	-X52	52	-X5MEP24C	
022.0165	-W33	E.V.+ PRESS.	0.50	106	GIALLO	-X51	51	-X5MEP24C	
022.0165	-W33	E.V.+ PRESS.	0.50	121	BLU'	-X55	55	-X5	D
022.0165	-W33	E.V.+ PRESS.	0.50	162	ROSSO	-X53	53	-X6	K
022.0165	-W33	E.V.+ PRESS.	0.50	262	NERO	-X54	54	-K09	A1
022.0144	-W70	CARICAMENTO CB	0.50		BIANCO				
022.0144	-W70	CARICAMENTO CB	0.50		MARRONE				
022.0144	-W70	CARICAMENTO CB	0.50	318	VERDE	-X3MEP 24C		-X3F/CB	318
022.0144	-W70	CARICAMENTO CB	0.50	317	GIALLO	-X3MEP 24C		-X3F/CB	317
022.0144	-W70	CARICAMENTO CB	0.50	316	GRIGIO	-X3MEP 24C		-X3F/CB	316
022.0144	-W70	CARICAMENTO CB	0.50		ROSA				
022.0144	-W70	CARICAMENTO CB	0.50	088	BLU'	-X49	F	-X3F/CB	088
022.0144	-W70	CARICAMENTO CB	0.50	112	ROSSO	-K09	21	-X3F/CB	112
022.0144	-W70	CARICAMENTO CB	0.50	315	NERO	-X3MEP 24C		-X3F/CB	315
022.0144	-W70	CARICAMENTO CB	0.50	319	VIOLA	-X3MEP 24C		-X3F/CB	319
022.0144	-W70	CARICAMENTO CB	0.50		SCHERMO				
022.0138	-W71	AVANZAMENTO CB	0.50	060	BIANCO	-X5	D	-X2F/CB	060
022.0138	-W71	AVANZAMENTO CB	0.50	062	MARRONE	-X6	K	-X2F/CB	062
022.0138	-W71	AVANZAMENTO CB	0.50	307	VERDE	-X3MEP 24C		-X2F/CB	307
022.0138	-W71	AVANZAMENTO CB	0.50		GIALLO				
022.0138	-W71	AVANZAMENTO CB	0.50	308	GRIGIO	-X3MEP 24C		-X2F/CB	308
022.0138	-W71	AVANZAMENTO CB	0.50	309	ROSA	-X3MEP 24C		-X2F/CB	309
022.0138	-W71	AVANZAMENTO CB	0.50		SCHERMO				
022.0172G/V	-W100	PE QUADRO COMANDI	1.50		GIALLO/VERDE	-XPE			PE
022.0172G/V	-W101	PE QUADRO COMANDI/TA-STIERA	1.50		GIALLO/VERDE		PE		PE
022.0171M	-W102	PONTE RESET	0.50	62	MARRONE	-S3	3	-S3	3
022.0171M	-W103	PONTE RESET	0.50	62	MARRONE	-S4	2	-S3	3
022.0172G/V	-W105	PE STEP MOTOR ALIMENTA-TORE	1.50		GIALLO/VERDE	-XPE		-M8	PE
022.0172G/V	-W107	PE STEP MOTOR ALIMENTA-TORE	1.50		GIALLO/VERDE	-X		-XPE	
022.0172G/V	-W108	PE DRIVER	1.50		GIALLO/VERDE	-XPE		-X4D	PE
022.0172G/V	-W109	PE CPU	1.50		GIALLO/VERDE	-X1MEP 24C		-XPE	
022.0172G/V	-W110	PE INVERTER	1.50		GIALLO/VERDE	-X100	PE	-XPE	
022.0172G/V	-W111	PE ILME	1.50		GIALLO/VERDE	-XPE		-X1F/CB	
022.0172G/V	-W112	PE PANNELLO VERTICALE	1.50		GIALLO/VERDE	-XPE			PE
022.0172G/V	-W113	PE/T3:0 VAC(0-24)	1.50		GIALLO/VERDE	-XPE		-T3	0
022.0172G/V	-W114	PE/T4:0 VAC(0-220)	1.50		GIALLO/VERDE	-XPE		-T4	0
022.0172G/V	-W115	PE/T4:PE(500 VA)	1.50		GIALLO/VERDE	-XPE		-T4	
022.0172G/V	-W116	PE/T3:PE(200 VA O-24V))	1.50		GIALLO/VERDE	-XPE		-T3	PE
022.0172G/V	-W117	PE/T2:PE(200 VA O-19V))	1.50		GIALLO/VERDE	-XPE		-T2	PE
022.0172N	-W119	Q0:3/K0:D1	1.50	2	NERO	-Q0	3	-K0	D1
022.0172N	-W120	Q0:5/K0:D2	1.50	3	NERO	-Q0	5	-K0	D2
022.0172N	-W121	Q0:2/X2:B	1.50	5	NERO	-Q0	2	-X2	B
022.0172N	-W122	Q0:4/X3:C	1.50	6	NERO	-Q0	4	-X3	C
022.0172N	-W123	Q0:6/X4:A	1.50	7	NERO	-Q0	6	-X4	A

Code	Cable	Description	Ø	No.	Colour	Start		End	
022.0172N	-W126	F3/X4:A	1.50	10	NERO	-F3		-X4	A
022.0172N	-W127	F4/X3:C	1.50	11	NERO	-F4		-X3	C
022.0172N	-W128	F5/X4:A	1.50	12	NERO	-F5		-X4	A
022.0172N	-W129	F6/X3:C	1.50	13	NERO	-F6		-X3	C
022.0172N	-W130	F7/X4:A	1.50	14	NERO	-F7		-X4	A
022.0172N	-W131	F8/X3:C	1.50	15	NERO	-F8		-X3	C
022.0172N	-W134	F3/T2:400(200VA 0-19V)	1.50	18	NERO	-F3		-T2	400
022.0172N	-W135	F4/T2:0(200VA 0-19V)	1.50	19	NERO	-F4		-T2	0
022.0172N	-W136	F5/T3:400(200VA 0-24V)	1.50	20	NERO	-F5		-T3	400
022.0172N	-W137	F6/T3:0(200VA 0-24V)	1.50	21	NERO	-F6		-T3	0
022.0172N	-W138	F7/T4:400(500VA)	1.50	22	NERO	-F7		-T4	400
022.0172N	-W139	F8/T4:0(500VA)	1.50	23	NERO	-F8		-T4	0
022.0172N	-W140	X2:B/X100:L1	1.50	24	NERO	-X100	R/L1	-X2	B
022.0172N	-W141	X3:C/X100:L2	1.50	25	NERO	-X100	R/L2	-X3	C
022.0172N	-W142	X4:A/X100:L3	1.50	26	NERO	-X100	R/L3	-X4	A
022.0172N	-W143	X15:25/K2:1	1.50	27	NERO	-X15	25	-K2	1
022.0172N	-W144	X16:26/K2:3	1.50	28	NERO	-X16	26	-K2	3
022.0172N	-W145	X17:27/K2:5	1.50	29	NERO	-X17	27	-K2	5
022.0172N	-W146	K2:1/K1:1	1.50	27	NERO	-K2	1	-K1	1
022.0172N	-W147	K2:3/K1:3	1.50	28	NERO	-K2	3	-K1	3
022.0172N	-W148	K2:5/K1:5	1.50	29	NERO	-K2	5	-K1	5
022.0172N	-W149	K3:1/K3:3	1.50	30	NERO	-K3	3	-K3	1
022.0172N	-W150	K3:3/K3:5	1.50	30	NERO	-K3	5	-K3	3
022.0172N	-W151	K3:2/K1:2	1.50	31	NERO	-K3	2	-K1	2
022.0172N	-W152	K3:4/K1:4	1.50	32	NERO	-K3	4	-K1	4
022.0172N	-W153	K3:6/K1:6	1.50	33	NERO	-K3	6	-K1	6
022.0172N	-W154	X2:B/K4:1	1.50	37	NERO	-K4	1	-X2	B
022.0172N	-W155	X3:C/K4:3	1.50	28	NERO	-K4	3	-X3	C
022.0172N	-W156	X4:A/K4:5	1.50	39	NERO	-K4	5	-X4	A
022.0172N	-W157	K4:1/K6:1	1.50	37	NERO	-K6	1	-K4	1
022.0172N	-W158	K4:3/K6:3	1.50	38	NERO	-K6	3	-K4	3
022.0172N	-W159	K4:5/K6:5	1.50	39	NERO	-K6	5	-K4	5
022.0172N	-W172	X1MEP24C:1(CPU)/T2:0(O-19 V)	1.50	81	NERO	-X1MEP 24C		-T2	0
022.0172N	-W173	X1MEP24C:2(CPU)/F9	1.50	82	NERO	-F9		-X1MEP24C	
022.0172N	-W174	F9/T2:19(0-19V)	1.50	83	NERO	-F9		-T2	19
022.0172N	-W175	F10/T4:60(0-60V)	1.50	227	NERO	-F10		-T4	60
022.0172N	-W176	T4:0(0-60V)/X4D:AC(DRIVER)	1.50	228	NERO	-X4D	AC	-T4	0
022.0172N	-W177	X4D:AC(DRIVER)/F10	1.50	229	NERO	-X4D	AC	-F10	
022.0172N	-W178	X100(INVERTER):T1/X18:28	1.50	127	NERO	-X100	U/T1	-X18	28
022.0172N	-W179	X100(INVERTER):T2/X19:29	1.50	128	NERO	-X100	V/T2	-X19	29
022.0172N	-W180	X100(INVERTER):T3/X20:30	1.50	129	NERO	-X100	W/T 3	-X20	30
022.0172R	-W183	T4:220(0-220V)/F11	1.50	48	ROSSO	-F11		-T4	220
022.0172R	-W184	T4:0(0-220V)/M7:U	1.50	49	ROSSO	-M7	U	-T4	0
022.0172R	-W185	F11/M7:V	1.50	50	ROSSO	-M7	V	-F11	
022.0171L	-W188	T3:0(0-24V)/X5:D	0.50	60	BLU'	-X5	D	-T3	0
022.0171L	-W190	X49:F/X100(INVERTER):R1B	0.50	67	BLU'	-X100	R1B	-X49	F

Code	Cable	Description	Ø	No.	Colour	Start		End	
022.0171L	-W189	X49:F/X1MEP24C:5(CPU)	0.50	68	BLU'	-X1MEP 24C		-X49	F
022.0171L	-W193	X5:D/K4:A2	0.50	55	BLU'	-X5	D	-K4	A2
022.0171L	-W194	K4:A2/K6:A2	0.50	55	BLU'	-K6	A2	-K4	A2
022.0171L	-W195	K6:A2/K1:A2	0.50	55	BLU'	-K6	A2	-K1	A2
022.0171L	-W196	K1:A2/K3:A2	0.50	55	BLU'	-K1	A2	-K3	A2
022.0171L	-W197	K3:A2/K2:A2	0.50	55	BLU'	-K3	A2	-K2	A2
022.0171L	-W198	K2:A2/K12:A2	0.50	55	BLU'	-K12	A2	-K2	A2
022.0171L	-W199	K12:A2/K11:A2	0.50	55	BLU'	-K12	A2	-K11	A2
022.0171L	-W200	K11:A2/K10:A2	0.50	55	BLU'	-K11	A2	-K10	A2
022.0171L	-W201	K10:A2/K9:A2	0.50	55	BLU'	-K10	A2	-K9	A2
022.0171L	-W202	K9:A2/K09:A2	0.50	55	BLU'	-K09	A2	-K9	A2
022.0171L	-W203	K09:A2/K8:A2	0.50	55	BLU'	-K8	A2	-K09	A2
022.0171L	-W212	K8:21/X49:F	0.50	63	BLU'	-X49	F	-K8	21
022.0171L	-W213	X2MEP24C:13(IUV)/X49:F	0.50	421	BLU'	-X2MEP 24C		-X49	F
022.0171R	-W216	T3:24(O-24V)/F12	0.50	61	ROSSO	-F12		-T3	24
022.0171R	-W217	F12/X6:K	0.50	217	ROSSO	-X6	K	-F12	
022.0171R	-W220	F14/XIMEP24C:6(CPU)	0.50	69	ROSSO	-X1MEP 24C		-F14	
022.0171R	-W223	F14/X48:E	0.50	66	ROSSO	-F14		-X48	E
022.0171R	-W225	X48:E/X2MEP24C:14(IUV)	0.50	422	ROSSO	-X2MEP 24C		-X48	E
022.0171R	-W226	X6:K/K12:24	0.50	62	ROSSO	-X6	K	-K12	24
022.0171R	-W227	K12:24/K11:24	0.50	62	ROSSO	-K11	24	-K12	24
022.0171R	-W228	K11:24/K10:24	0.50	62	ROSSO	-K10	24	-K11	24
022.0171R	-W229	K2:52/K3:52	0.50	57	ROSSO	-K2	52	-K3	52
022.0171R	-W230	K2:A1/K1:51	0.50	86	ROSSO	-K1	51	-K2	A1
022.0171R	-W232	K1:A1/K3:51	0.50	87	ROSSO	-K3	51	-K1	A1
022.0171R	-W233	K9:21/X100:LI1(INVERTER)	0.50	58	ROSSO	-X100	LI1	-K9	21
022.0171R	-W234	K9:24/X100:+24(INVERTER)	0.50	59	ROSSO	-X100	+24	-K9	24
022.0171R	-W235	K12:A1/K10:21	0.50	621	ROSSO	-K12	A1	-K10	21
022.0171R	-W236	K10:21/K11:21	0.50	621	ROSSO	-K10	21	-K11	21
022.0171R	-W239	K8:14/K10:11	0.50	418	ROSSO	-K10	11	-K8	14
022.0171R	-W240	K11:14/K11:A1	0.50	217	ROSSO	-K11	A1	-K11	14
022.0171R	-W241	K10:14/K10:A1	0.50	317	ROSSO	-K10	A1	-K10	14
022.0171R	-W237	K8:11/K09:11	0.50	318	ROSSO	-K09	11	-K8	11
022.0171C	-W243	T0(T.AMP)/X2MEP24C:15(IUV)	0.50	423	ARANCIO	-T0		-X2MEP24C	
022.0171C	-W244	T0(T.AMP)/X2MEP24C:16(IUV)	0.50	424	ARANCIO	-T0		-X2MEP24C	
022.0171C	-W245	X5MEP24:1(IUD1)/X5MEP24:10(IUD1)	0.50	101	ARANCIO	-X5MEP 24C		-X5MEP24C	
022.0171C	-W246	X5MEP24:10(IUD1)/X4MEP24:1(IUD2)	0.50	101	ARANCIO	-X4MEP 24C		-X5MEP24C	
022.0171C	-W247	X4MEP24:1(IUD2)/X4MEP24:10(IUD2)	0.50	101	ARANCIO	-X4MEP 24C		-X4MEP24C	
022.0171C	-W248	X4MEP24:10(IUD2)/X3MEP24:1(IUD3)	0.50	101	ARANCIO	-X3MEP 24C		-X4MEP24C	
022.0171C	-W249	X3MEP24:1(IUD3)/X3MEP24:10(IUD3)	0.50	101	ARANCIO	-X3MEP 24C		-X3MEP24C	
022.0171C	-W250	X3MEP24:10(IUD3)/K12:21	0.50	101	ARANCIO	-K12	21	-X3MEP24C	
022.0171C	-W251	X5MEP24C:2(IUD1)/K2:51	0.50	102	ARANCIO	-X5MEP 24C		-K2	51
022.0171C	-W252	X5MEP24C:3(IUD1)/K1:52	0.50	103	ARANCIO	-X5MEP 24C		-K1	52
022.0171C	-W253	X5MEP24C:4(IUD1)/K1:62	0.50	104	ARANCIO	-X5MEP 24C		-K1	62

Code	Cable	Description	Ø	No.	Colour	Start		End	
022.0171C	-W254	X5MEP24C:8(IUD1)/K4:A1	0.50	108	ARANCIO	-X5MEP 24C		-K4	A1
022.0171C	-W255	X4MEP24C:2(IUD2)/K6:A1	0.50	202	ARANCIO	-X4MEP 24C		-K6	A1
022.0171C	-W256	X4MEP24C:9(IUD2)/K9:A1	0.50	209	ARANCIO	-X4MEP 24C		-K9	A1
022.0171B	-W265	X4MEP24:19(IUD2)/X1OO:R1 C(INV.)	0.50	219	BIANCO	-X100	R1C	-X4MEP24C	
022.0171B	-W266	X3MEP24:20(IUD3)/X4MEP24: 20(IUD2	0.50	120	BIANCO	-X3MEP 24C		-X4MEP24C	
022.0171B	-W267	X4MEP24:20(IUD2)/X5MEP24: 20(IUD1	0.50	120	BIANCO	-X4MEP 24C		-X5MEP24C	
022.0171B	-W268	X5MEP24:20(IUD1)/X48:E	0.50	120	BIANCO	-X48	E	-X5MEP24C	
022.0171B	-W262	X5MEP24:12(IUD1)/K09:24	0.50	112	BIANCO	-X5MEP 24C		-K09	24
022.0171B	-W263	X5MEP24:16(IUD1)/K8:24	0.50	116	BIANCO	-X5MEP 24C		-K8	24
022.0160	-W37	LAMPEGGIANTE	0.50		MARRONE	-H1		-X14	
022.0160	-W37	LAMPEGGIANTE	0.50		BLU'	-H1		-X14	
022.0160	-W51P	PRESSOSTATO	0.50	162	MARRONE	-X53	53	-S14	1
022.0160	-W51P	PRESSOSTATO	0.50	262	BLU'	-X54	54	-S14	4
022.0160	-W43P	E.V. CH/AP CMA	0.50	107	MARRONE	-X52	52	-K15	A1
022.0160	-W43P	E.V. CH/AP CMA	0.50	121	BLU'	-X55	55	-K15	A2
022.0160	-W46P	E.V. CH/AP CMT	0.50	106	MARRONE	-X51	51	-K18	A1
022.0160	-W46P	E.V. CH/AP CMT	0.50	121	BLU'	-X55	55	-K18	A2
022.0160	-W47P	E.V. DISC./SAL. CPT	0.50	105	MARRONE	-X50	50	-K19	A1
022.0160	-W47P	E.V. DISC./SAL. CPT	0.50	121	BLU'	-X55	55	-K19	A2
022.0143	-W29	STEP MOTOR ALIMENTATO-RE	1.50	224	BIANCO	-M8	A	-X1D	A1
022.0143	-W29	STEP MOTOR ALIMENTATO-RE	1.50	222	MARRONE	-M8	B	-X1D	B1
022.0143	-W29	STEP MOTOR ALIMENTATO-RE	1.50	221	VERDE	-M8	B	-X1D	B2
022.0143	-W29	STEP MOTOR ALIMENTATO-RE	1.50	223	GIALLO	-M8	A	-X1D	A2
022.0143	-W29	STEP MOTOR ALIMENTATO-RE	1.50		SCHERMO	-X		-SCH	SCH
022.0172N	-W270	X2:B/X1FCB:1	1.50	001	NERO	-X2	B	-X1F/CB	
022.0172N	-W271	X3:C/X1FCB:2	1.50	002	NERO	-X3	C	-X1F/CB	
022.0172N	-W272	X4:A/X1FCB:3	1.50	003	NERO	-X4	A	-X1F/CB	
022.0171R	-W231	K1:61/K3:A1	0.50	88	ROSSO	-K1	61	-K3	A1
022.0171R	-W238	K8:12/K11:11	0.50	518	ROSSO	-K11	11	-K8	12
022.0141	-W35	EMERGENZA PEDALIERA	0.50		BIANCO				
022.0141	-W35	EMERGENZA PEDALIERA	0.50		MARRONE				
022.0141	-W35	EMERGENZA PEDALIERA	0.50	0218	VERDE	-X99	H	-S12	1
022.0141	-W35	EMERGENZA PEDALIERA	0.50	220	GIALLO	-S12	2	-K09	14
022.0141	-W35	EMERGENZA PEDALIERA	0.50		SCHERMO	-XPE		-SCH	SCH
022.0160	-W36	PEDALIERA	0.50	113	MARRONE	-S13	3	-X5MEP24C	
022.0160	-W36	PEDALIERA	0.50	066	BLU'	-S13	4	-X49	F

List of components

Code	ID	Rif	Description	Manufacturer
022.1128	-F3	/1.2	FUSIBILE VETRO 5X20 5A	COMAPEL SRL
022.2246	-F3	/1.2	MORSETTO PORTAFUSIBILE	PHOENIX
022.2301	-F3	/1.2	PIASTRA PROT. TEN. (SAETTE)	PHOENIX

Code	ID	Rif	Description	Manufacturer
022.1128	-F4	/1.2	FUSIBILE VETRO 5X20 5A	COMAPEL SRL
022.2246	-F4	/1.2	MORSETTO PORTAFUSIBILE	PHOENIX
022.2301	-F4	/1.2	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.1128	-F5	/1.2	FUSIBILE VETRO 5X20 5A	COMAPEL SRL
022.2246	-F5	/1.2	MORSETTO PORTAFUSIBILE	PHOENIX
022.2301	-F5	/1.2	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.1128	-F6	/1.3	FUSIBILE VETRO 5X20 5A	COMAPEL SRL
022.2246	-F6	/1.3	MORSETTO PORTAFUSIBILE	PHOENIX
022.2301	-F6	/1.3	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.1128	-F7	/1.3	FUSIBILE VETRO 5X20 5A	COMAPEL SRL
022.2246	-F7	/1.3	MORSETTO PORTAFUSIBILE	PHOENIX
022.2301	-F7	/1.3	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.1128	-F8	/1.3	FUSIBILE VETRO 5X20 5A	COMAPEL SRL
022.2246	-F8	/1.3	MORSETTO PORTAFUSIBILE	PHOENIX
022.2301	-F8	/1.3	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.1124	-F9	/1.7	FUSIBILE VETRO 5X20 10A	OMEGA FUSIBILI SRL
022.2246	-F9	/1.7	MORSETTO PORTAFUSIBILE	PHOENIX
022.1124	-F10	/1.7	FUSIBILE VETRO 5X20 10A	OMEGA FUSIBILI SRL
022.2246	-F10	/1.7	MORSETTO PORTAFUSIBILE	PHOENIX
022.1127	-F11	/1.9	FUSIBILE VETRO 5X20 2A	COMAPEL SRL
022.2246	-F11	/1.9	MORSETTO PORTAFUSIBILE	PHOENIX
022.2301	-F11	/1.9	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.1128	-F12	/1.7	FUSIBILE VETRO 5X20 5A	COMAPEL SRL
022.2246	-F12	/1.7	MORSETTO PORTAFUSIBILE	PHOENIX
022.1127	-F14	/6.2	FUSIBILE VETRO 5X20 2A	COMAPEL SRL
022.2246	-F14	/6.2	MORSETTO PORTAFUSIBILE	PHOENIX
022.0360	-H1	/5.9	LAMPEGGIANTE 24V SH 400	
022.0582	-K0	/1.2	BOBINA SGANCIO	ROCKWELL
022.0104	-K1	/4.2	CONTATTORE GRANDE	ROCKWELL
022.0656	-K1	/4.2	ANTIDISTURBO PER CONTATTORE GR	ROCKWELL
022.0622	-K1	/4.2	CONTATTI AUSILIARI CONT. GRAND	ROCKWELL
022.0104	-K2	/4.4	CONTATTORE GRANDE	ROCKWELL
022.0656	-K2	/4.4	ANTIDISTURBO PER CONTATTORE GR	ROCKWELL
022.0622	-K2	/4.4	CONTATTI AUSILIARI CONT. GRAND	ROCKWELL
022.0104	-K3	/4.3	CONTATTORE GRANDE	ROCKWELL
022.0656	-K3	/4.3	ANTIDISTURBO PER CONTATTORE GR	ROCKWELL
022.0622	-K3	/4.3	CONTATTI AUSILIARI CONT. GRAND	ROCKWELL
022.0093	-K4	/4.1	MINICONTATTORE 9A CA 4-9-10	ROCKWELL AUTOMATION
022.0655	-K4	/4.1	ANTIDISTURBO PER TELEINVERTITO	ROCKWELL AUTOMATION
022.0093	-K6	/4.1	MINICONTATTORE 9A CA 4-9-10	ROCKWELL AUTOMATION
022.0655	-K6	/4.1	ANTIDISTURBO PER TELEINVERTITO	ROCKWELL AUTOMATION
022.0992	-K8	/4.9	REL 24 VAC COMPLETO DI ZOCCOL	SIEI PETERLONGO SPA
022.0992	-K9	/4.7	REL 24 VAC COMPLETO DI ZOCCOL	SIEI PETERLONGO SPA
022.0992	-K09	/4.8	REL 24 VAC COMPLETO DI ZOCCOL	SIEI PETERLONGO SPA
022.0992	-K10	/4.6	REL 24 VAC COMPLETO DI ZOCCOL	SIEI PETERLONGO SPA

Code	ID	Rif	Description	Manufacturer
022.0992	-K11	/4.6	REL 24 VAC COMPLETO DI ZOCCOL	SIEI PETERLONGO SPA
022.0992	-K12	/4.5	REL 24 VAC COMPLETO DI ZOCCOL	SIEI PETERLONGO SPA
043.0609	-K15	/8.4	VALVOLA PER MODELLO AX E TI-CB	PARKER
022.0413	-K15	/8.4	CONNETTORE CON LED + VARISTORE	SMC ITALIA SPA
022.0586	-K15	/8.4	BOBINA PS 1 E 491B PARKER	PARKER HANNIFIN SPA
043.0609	-K18	/8.5	VALVOLA PER MODELLO AX E TI-CB	PARKER
022.0413	-K18	/8.5	CONNETTORE CON LED + VARISTORE	SMC ITALIA SPA
022.0586	-K18	/8.5	BOBINA PS 1 E 491B PARKER	PARKER HANNIFIN SPA
043.0609	-K19	/8.5	VALVOLA PER MODELLO AX E TI-CB	PARKER
022.0413	-K19	/8.5	CONNETTORE CON LED + VARISTORE	SMC ITALIA SPA
022.0586	-K19	/8.5	BOBINA PS 1 E 491B PARKER	PARKER HANNIFIN SPA
022.0615	-K21	/9.8	BOBINA VALVOLA RIGENERATRICE S	TECNAIRE
022.0378	-K21	/9.8	CONNETT. BOBINA VALVOLA RIGENE	TECNAIRE
044.1251	-K21	/9.8	VALVOLA RIG. SX-AX-CNC	TECNAIRE
022.0588	-L1	/3.7	FILTRO INVERTER	FIN MOTOR
019.1603	-M1	/3.6	MOTORE KW 1.8/1.3 3K100L 4/8 3	CARPANELLI MOTORI
028.0231	-M2	/2.2	ELETTROPOMPA TRIFASE	SAMEC
025.0771	-M5	/2.4	MOTORID. PER EVACUAT. TRUCIOLI	BONFIGLIOLI
019.5211	-M7	/1.9	VENTOLA QUADRO ELETTRICO	CEM
019.5117	-M7	/1.9	COPRIVENTOLA QUADRO	CEM
019.3401	-M8	/2.8	STEP MOTOR ALIMENTATORE (MOTOR	EW HOF
019.3551	-M9	/6.9	STEP MOTOR CILINDRO (MOTORE PA	JAPAN SERVO
022.1260	-Q0	/1.3	INTERRUTORE TERMICO	ROCKWELL
022.0123	-Q0	/1.3	COMANDO BLOCCOPORTA LUCCHETTAB	ROCKWELL
022.0045	-R1	/5.2	POTENZIOMETRO 10 K	BUNS
034.1166	-R1	/5.2	MANOPOLA PER COMANDO POTENZIOM	ELMI
022.0045	-R3	/3.3	POTENZIOMETRO 10 K	BUNS
034.1166	-R3	/3.3	MANOPOLA PER COMANDO POTENZIOM	ELMI
022.0046	-R5	/6.5	POTENZIOMETRO 6639S-001-202	BUNS
022.0507	-S1	/9.9	FINECORSA D4C-1902 2M ALIM. CN	OMRON
022.0507	-S2	/9.9	FINECORSA D4C-1902 2M ALIM. CN	OMRON
022.1401	-S3	/5.4	PULSANTE 800 EQ-F5 RESET	ROCKWELL AUTOMATION
022.0629	-S3	/5.4	PORTACONTATTI PER PULSANTE RES	ROCKWELL AUTOMATION
022.0939	-S3	/5.4	BLOCCHETTO N.A.DE 310	ROCKWELL AUTOMATION
022.0939	-S3	/5.4	BLOCCHETTO N.A.DE 310	ROCKWELL AUTOMATION
022.0939	-S3	/5.4	BLOCCHETTO N.A.DE 310	ROCKWELL AUTOMATION
022.1242	-S4	/5.6	EMERGENZA 800 EP-MTS 443LX01	ROCKWELL AUTOMATION
022.0940	-S4	/5.6	BLOCCHETTO N.C.DE 301	ROCKWELL AUTOMATION
022.0507	-S9	/9.5	FINECORSA D4C-1902 2M ALIM. CN	OMRON
022.0508	-S10	/9.6	FINECORSA	OMRON
022.0503	-S11	/9.6	FINECORSA CROUZET 83.123.018	CROUZET
022.1242	-S12	/5.8	EMERGENZA 800 EP-MTS 443LX01	ROCKWELL AUTOMATION
022.1001	-S13	/5.8	COMANDO A PEDALIERA	COMEPI
043.0143	-S14	/8.3	PRESSOSTATO SH PNEUMATICO	PARKER
022.0507	-S26	/9.7	FINECORSA D4C-1902 2M ALIM. CN	OMRON

Code	ID	Rif	Description	Manufacturer
022.0069	-T0	/3.5	TRASFORMATORE AMPEROMETRICO	CARLO GAVAZZI
022.0455	-T2	/1.6	TR: 200W 0-230-400V 0-19V 50/6	W.A.N.
022.0457	-T3	/1.6	TR: 200W 0-230-400V 0-24V 50/6	W.A.N.
022.1601	-T4	/1.6	TR: 500W 0-230-400V 0-220V 0-	W.A.N.
	-X1 Q.C.	/6.2		
022.0262	-X1F/CB	/10.7	FRUTTO FEMMINA ILME	ILME
022.0281	-X1F/CB	/10.7	CUSTODIA PER FRUTTO FEMMINA IL	ILME
022.0833	-X1MEP 24C	/6.0	CPU SH 400	DONATI
022.2251	-X2F/CB	/10.7	MORSETTTO 10 ANS A MOLLA	PHOENIX
022.0831	-X2MEP 24C	/6.4	IUV	DONATI
022.2251	-X3F/CB	/10.7	MORSETTTO 10 ANS A MOLLA	PHOENIX
022.0832	-X3MEP 24C	/7.1	IUD	DONATI
022.0832	-X4MEP 24C	/7.4	IUD	DONATI
022.0892	-X4D	/1.8	DRIVER APS-P	SHS
022.0832	-X5MEP 24C	/7.7	IUD	DONATI

List of terminals

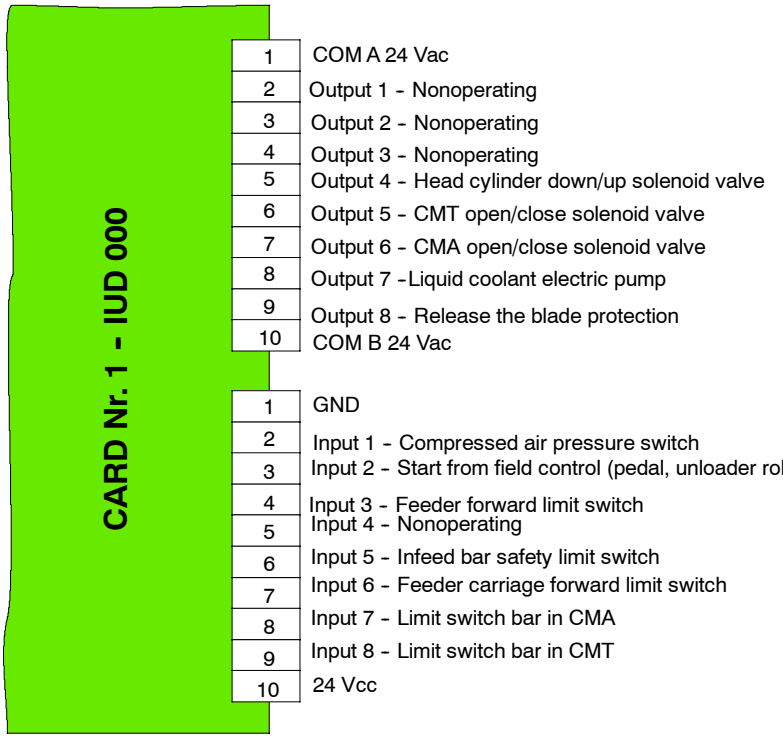
Code	ID	Rif	Description	Manufacturer
	-X	/2.7		
022.2243BIS	-X1	/1.1	MORSETTO SINGOLO A MOLLA BLU	PHOENIX
022.2245	-X2	/1.2	MORSETTO QUADRUPLO	PHOENIX
022.2301	-X2	/1.2	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2301	-X2	/1.2	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2245	-X3	/1.3	MORSETTO QUADRUPLO	PHOENIX
022.2245	-X3	/1.3	MORSETTO QUADRUPLO	PHOENIX
022.2271	-X3	/1.3	PONTICELLO SINGOLO	PHOENIX
022.2301	-X3	/1.3	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2301	-X3	/1.3	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2301	-X3	/1.3	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2301	-X3	/1.3	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2245	-X4	/1.4	MORSETTO QUADRUPLO	PHOENIX
022.2245	-X4	/1.4	MORSETTO QUADRUPLO	PHOENIX
022.2271	-X4	/1.4	PONTICELLO SINGOLO	PHOENIX
022.2301	-X4	/1.4	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2301	-X4	/1.4	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2301	-X4	/1.4	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2301	-X4	/1.4	PIASTRA PROT. TEN. (SAETTE)	PHOENIX
022.2283	-X4	/1.4	PIASTRA TERMINALE QUADRUPLA	PHOENIX
022.2244	-X5	/1.7	MORSETTO TRIPLO	PHOENIX
022.2244	-X5	/1.7	MORSETTO TRIPLO	PHOENIX
022.2271	-X5	/1.7	PONTICELLO SINGOLO	PHOENIX
022.2244	-X6	/1.8	MORSETTO TRIPLO	PHOENIX
022.2244	-X6	/1.8	MORSETTO TRIPLO	PHOENIX
022.2271	-X6	/1.8	PONTICELLO SINGOLO	PHOENIX
022.0884	-X11	/5.2	M24 LD2(CNC)	DATA SRL

Code	ID	Rif	Description	Manufacturer
022.0881	-X11	/5.2	M24 CNSL(CNC)	DATA SRL
031.2044	-X12	/5.5	CONSOLLE DI PROGR. TI 350/CNC	SERIGRAFIA DIA
022.0883	-X13	/5.6	M24 LD1(CNC)	DATA SRL
022.0755	-X14	/5.9	DISPLAY MEP 24 LCD(CNC)	DATA SRL
022.0374	-X15	/3.6	MORSETTO SINGOLO A VITE	PHOENIX
022.0374	-X16	/3.6	MORSETTO SINGOLO A VITE	PHOENIX
022.0374	-X17	/3.6	MORSETTO SINGOLO A VITE	PHOENIX
022.0374	-X18	/3.8	MORSETTO SINGOLO A VITE	PHOENIX
022.0374	-X19	/3.8	MORSETTO SINGOLO A VITE	PHOENIX
022.0374	-X20	/3.8	MORSETTO SINGOLO A VITE	PHOENIX
022.2243	-X47	/9.9	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2245	-X48	/9.4	MORSETTO QUADRUPLO	PHOENIX
022.2245	-X49	/9.3	MORSETTO QUADRUPLO	PHOENIX
022.2244	-X49	/9.3	MORSETTO TRIPLO	PHOENIX
022.2244	-X49	/9.3	MORSETTO TRIPLO	PHOENIX
022.2272	-X49	/9.3	PONTICELLO DOPPIO	PHOENIX
022.2243	-X50	/8.1	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2243	-X51	/8.1	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2243	-X52	/8.2	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2243	-X53	/8.2	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2243	-X54	/8.3	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2243	-X55	/8.4	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2243	-X55	/8.4	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2271	-X55	/8.4	PONTICELLO SINGOLO	PHOENIX
022.2281	-X55	/8.4	PIASTRA TERMINALE SINGOLA	PHOENIX
022.2243	-X99	/5.8	MORSETTO SINGOLO A MOLLA	PHOENIX
022.2281	-X99	/5.8	PIASTRA TERMINALE SINGOLA	PHOENIX
022.0790	-X100	/3.6	INVERTER 2.2KW 3PH 380-440V 50	SCHNEIDER ELECTRIC
022.2321	-XPE	/9.2	MORSETTIERA EQUIPOTENZIALE	SEM SRL

List of IUD-IUV Card Inputs and Outputs

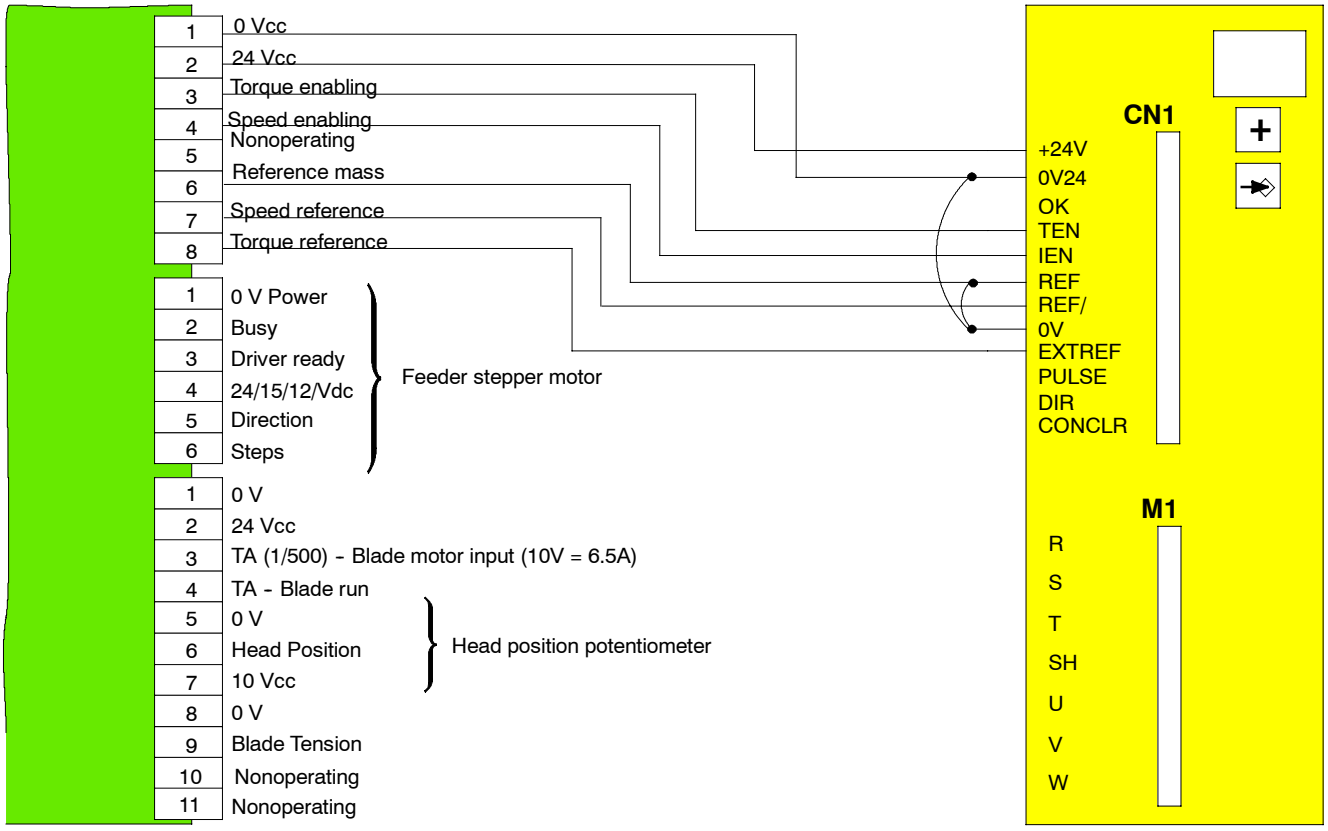
IUD: Digital Inputs and Outputs

The following chart lists the Digital Inputs and Outputs of card 1.


CARD Nr. 1 - IUD 000
1 COM A 24 Vac
2 Output 1 - Nonoperating
3 Output 2 - Nonoperating
4 Output 3 - Nonoperating
5 Output 4 - Head cylinder down/up solenoid valve
6 Output 5 - CMT open/close solenoid valve
7 Output 6 - CMA open/close solenoid valve
8 Output 7 -Liquid coolant electric pump
9 Output 8 - Release the blade protection
10 COM B 24 Vac
1 GND
2 Input 1 - Compressed air pressure switch
3 Input 2 - Start from field control (pedal, unloader robot)
4 Input 3 - Feeder forward limit switch
5 Input 4 - Nonoperating
6 Input 5 - Infeed bar safety limit switch
7 Input 6 - Feeder carriage forward limit switch
8 Input 7 - Limit switch bar in CMA
9 Input 8 - Limit switch bar in CMT
10 24 Vcc

IUV card: Miscellaneous Inputs and Outputs

The following chart lists the Miscellaneous Inputs and Outputs.

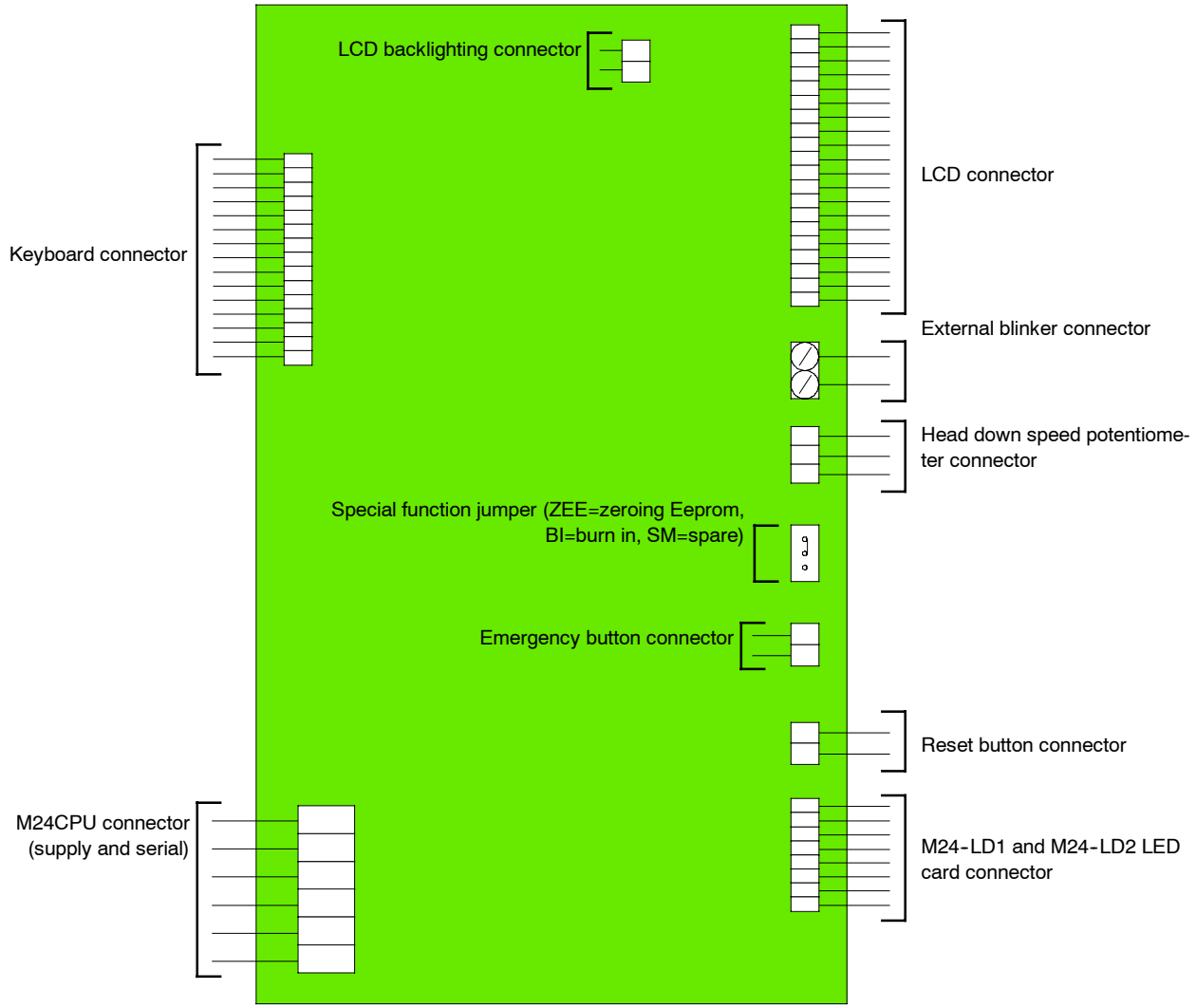


CN 1 VICE

CN 1 VICE Vice with 12 poled coupling		
Pin N°	**Signal**	**Signal description**
1	+V24	+24 Vdc power supply
2	0V24	Reference mass for the TEN, IEN isolated entrances
3	OK	Driver OK (10 Wmax – 100 Vmax – 100 mAmax). Exit relays indicating the state of the drive. –Contact closed at+24Vdc in normal functioning conditions. – Contact open in alarm conditions of the system
4	TEN	TORQUE ENABLE, signal of torque enabling Isolated digital entrance, active at +24Vdc. With the signal active the drive is enabled to provide torque to the motor. In absence of this signal the motor frees itself immediately.
5	IEN	INPUT ENABLE enabling signal of enabling of the speed reference. Isolated digital entrance, active at +24Vdc. With the signal active the drive enables the reading of the speed set–point present at the REF and REF/ analogical entrances. In absence of the signal the reading of the set–point is disabled and attributed to The value of 0V. With the motor in movement, the absence of the IEN signal causes the functioning motor to stop on the set ramp; the ramp ended the motor is held in torque and in position.
6	REF	External analogical reference signal ±10V of the speed. Entrance not invertible
7	REF/	External analogical reference signal ±10V of the speed Entrance invertible
8	0V	Reference mass of the REF\, REF & EXTREF signals.
9	EXTREF	EXTERNAL TORQUE REFERENCE. Analogical entrance (0÷10*V*) of torque limitations distributable to the motor: Entrance at 0V = no torque; Entrance not connected 0+10V = maximum torque
10	PULSE	Nonoperating
11	DIR	Nonoperating
12	CONCLR	Nonoperating

CNSL card: Console Inputs and Outputs

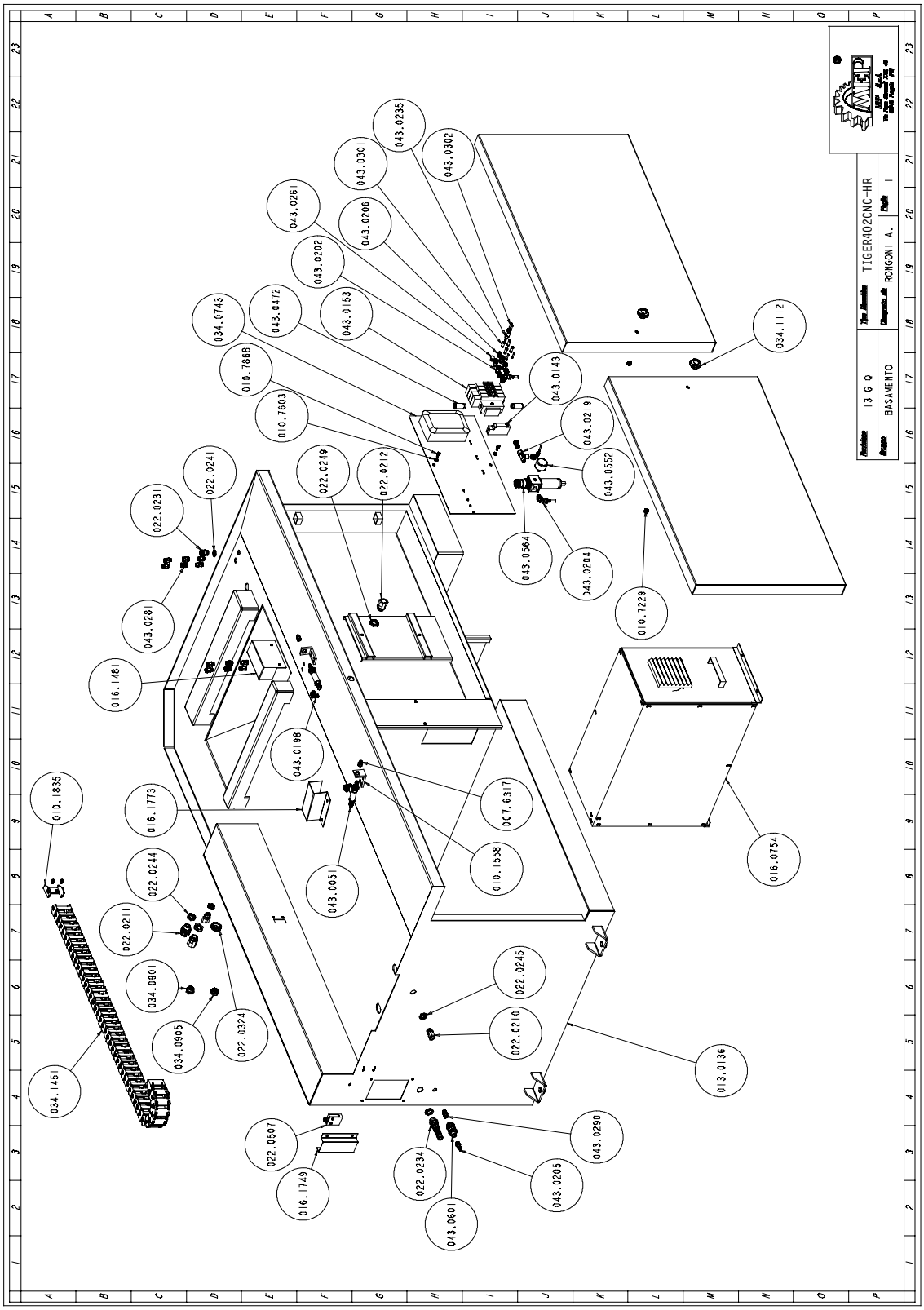
The following chart lists the Miscellaneous Inputs and Outputs.


LCD backlighting connector
Keyboard connector
LCD connector
External blinker connector
Head down speed potentiometer connector
Special function jumper (ZEE=zeroing Eeprom, BI=burn in, SM=spare)
Emergency button connector
Reset button connector
M24CPU connector (supply and serial)
M24-LD1 and M24-LD2 LED card connector

Exploded views

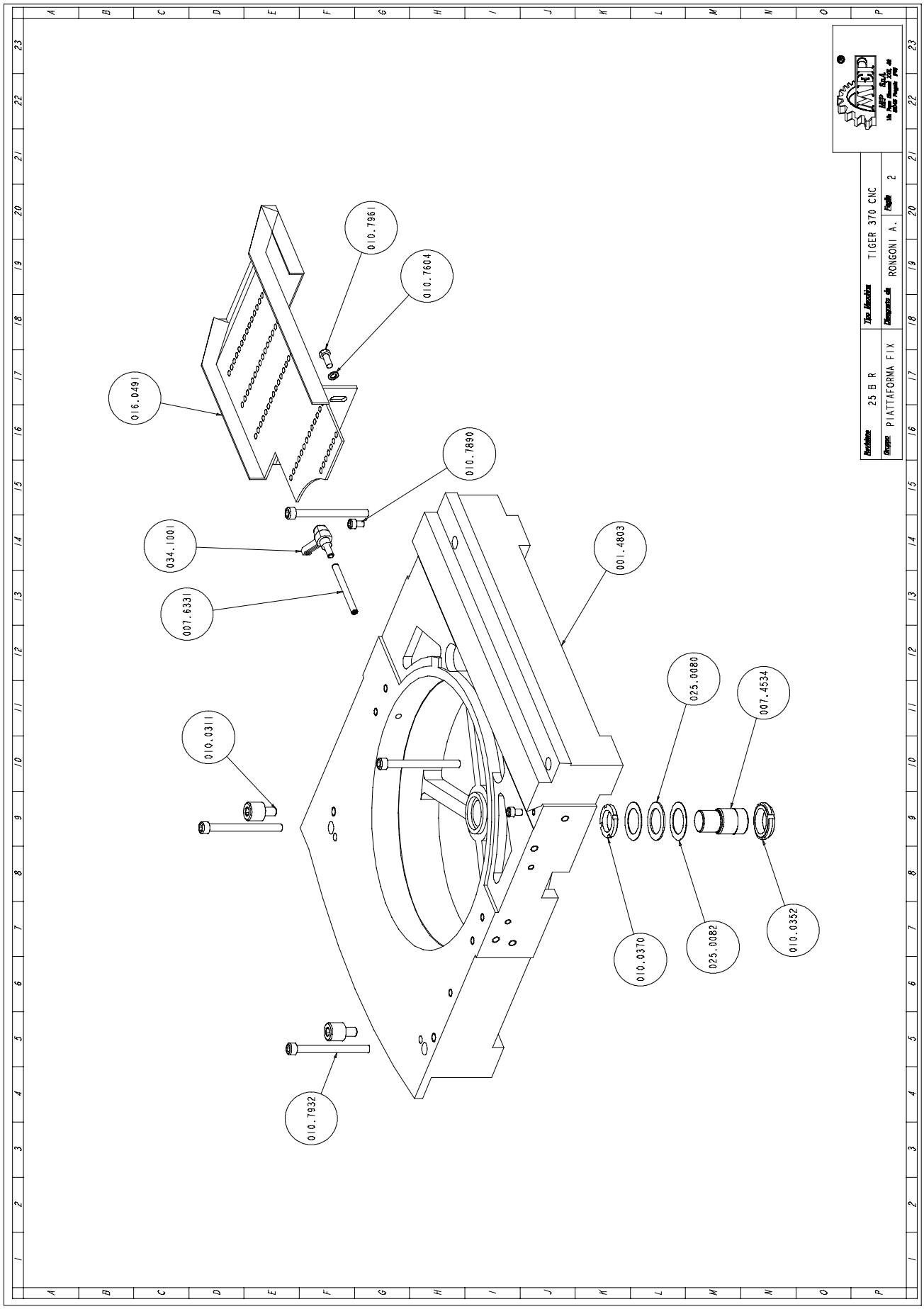
This part of the manual contains detailed exploded views of the machine which can help to gain a deeper knowledge of how it is made.

Base



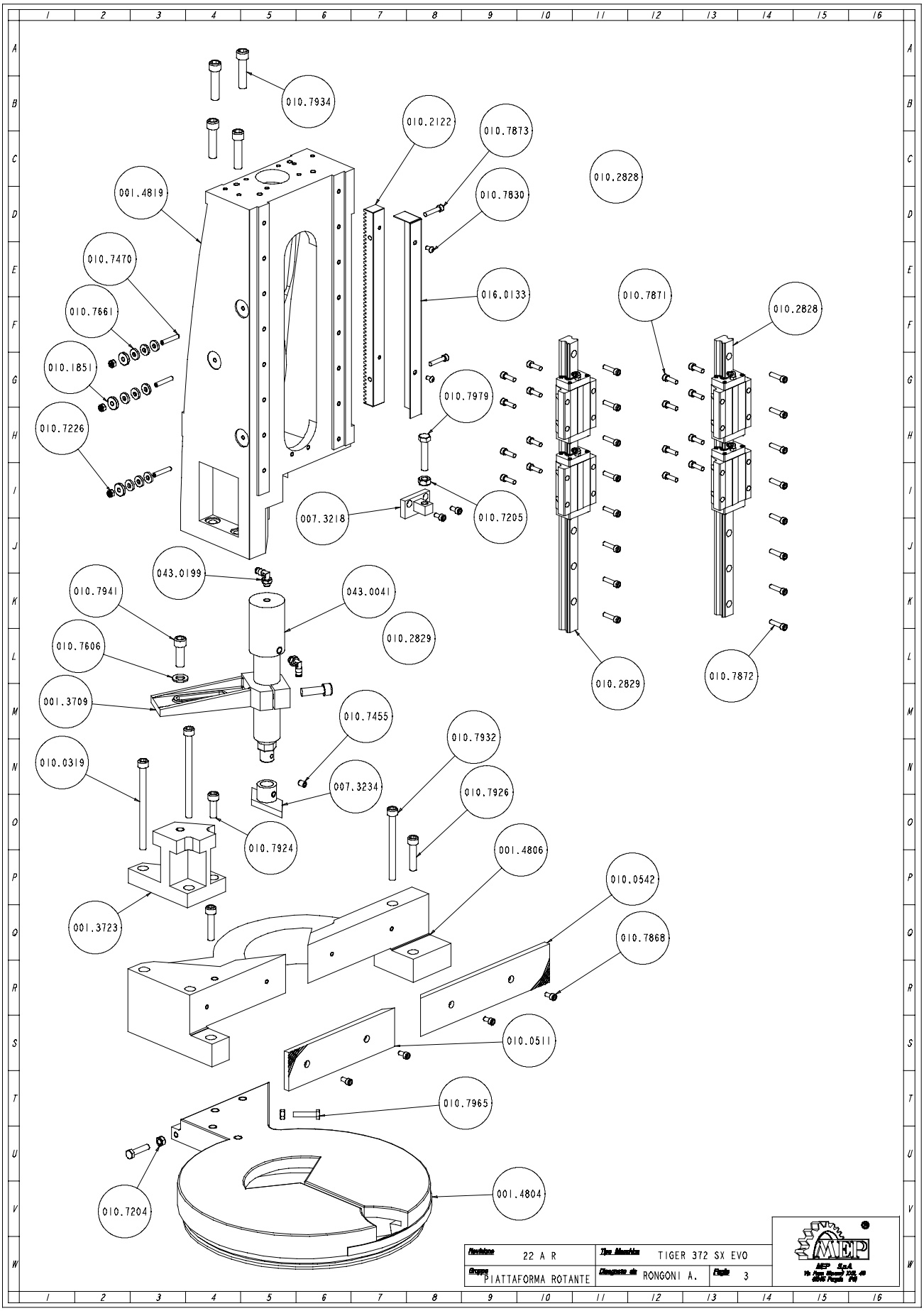
Code	Description	U. of M.	Quantity
010.1558	STAFFA FISSAGGIO CILINDRO SPORTELLO	NR	1,000
010.1835	SET ATTACCHI 117.4.12.P AX-CNC	NR	1,000
010.7229	DADO AUTOBLOCCANTE M8	NR	2,000
010.7603	RONDELLA DIAM. 6	NR	2,000
010.7830	VITE BUTON 5 X 10	NR	12,000
010.7868	VITE TCEI 6 X 12	NR	2,000
013.0136	PIEDISTALLO	NR	1,000
016.1481	STAFFA PROTEZIONE CILINDRO SPORTEL-	NR	1,000
016.1749	PROTEZIONE FINECORSA CARTER ALIMEN-	NR	1,000
022.0210	RACCORDO RAPIDO SEM PG 11	NR	1,000
022.0211	RACCORDO RAPIDO SEM PG 13,5	NR	1,000
022.0212	RACCORDO RAPIDO SEM PG 16	NR	1,000
022.0231	PRESSACAVO IN OTTONE 3/8 BM 2451	NR	1,000
022.0234	PRESSACORDONE 3246 NERO PG 13,5	NR	1,000
022.0241	DADO IN OTTONE BM 2461 3/8	NR	1,000
022.0244	CONTRODADO 3217B GRIGIO PG 13	NR	2,000
022.0245	CONTRODADO 3213B GRIGIO PG 11	NR	1,000
022.0249	DADO POLIAM.HUMMEL 1.262.1600.11	NR	1,000
022.0324	PASSACAVI 24 INC.MM.2.5	NR	1,000
022.0507	FINECORSA D4C-1G02 1M	NR	1,000
028.0121	RACCORDO 3/8-17 CL 2601	NR	1,000
028.0260	ELETTROPOMPA	NR	2,000
028.0391	TUBO LOOC LINE SPD FP50.10315 3/4	MT	1,000
028.0396	UGELLO 0 20 SPD FP50.11B50	NR	1,000
028.0401	RACCORDO 3/4 SPD FP50.17A20	NR	1,000
034.0746	QUADRO PNEUMATICO TI 350 CNC	NR	1,000
007.6317	STAFFA COMANDO MICROINTERRUTT.CN 90 TI 370 CNCFE	NR	2,000
034.0901	TAPPO LIVELLO OLIO 1/2 "GAS.	NR	1,000
034.0905	TAPPO OLIO TAO/3 1/2" NERO	NR	1,000
034.1112	VOLANTINO DIAM.40 M8	NR	2,000
034.1451	CATENA PORTACAVI E17.04.63.0	MT	1,000
043.0051	CILINDRO	NR	1,000
043.0143	PRESSOSTATO PNEUM.PS1P1091	NR	1,000
043.0161	BLOCCO DI VALVOLE DA 3 TI 350 CNCFE	NR	1,000
043.0180	RIDUZIONE M 3/4-F 3/8	NR	1,000
043.0192	RACCORDO RB 9889 3/4X20	NR	3,000
043.0198	ATTACCO A GOMITO GIREV.4X1/4 CL6521	NR	1,000
043.0204	ATTACCO A GOMITO 8X1/4 - CL 6521	NR	2,000
043.0205	ATTACCO A ESAGONO 8X1/4 - CL 6510	NR	1,000
043.0206	ATTACCO A ESAGONO 4X1/8 - CL 6511	NR	9,000
043.0219	RACCORDO A"T" MFF 1/4" CL-2070	NR	1,000
043.0223	RACCORDO TE FFF ZINCATO 3/4	NR	1,000
043.0261	TAPPO TTE8 1/8 - CL 2611	NR	1,000
043.0263	RACCORDO A GOMITO M/F ZINCATO 3/4	NR	2,000
043.0281	MANICOTTO 1/8 M 8/8 - CL 2543	NR	2,000
043.0282	MANICOTTO 3/8	NR	1,000
043.0290	INNESTO RAPIDO 1/4 GHIOTTO 13/A	NR	2,000
043.0472	SILENZIATORE 1/4- PLASTICA	NR	2,000
043.0552	MANOMETRO DIAM. 40	NR	1,000
043.0564	FR 1/4 20-08	NR	1,000
043.0601	VALVOLA VMS 114-1/4 08	NR	1,000
043.0654	RUBINETTO M/F 3/4 CL 6310	NR	1,000

Fixed worktable



Code	Description	U. of M.	Quantity
001.4803	PIATTAFORMA	NR	1,000
007.4534	PERNO DI CENTRO	NR	1,000
007.6331	PERNO BLOCCAGGIO PIANO GIREVOLE	NR	1,000
010.0311	VITE TCEI M12X16 BATT.PIANO GIREVO.	NR	2,000
010.0352	GHIERA AUTOBLOCCANTE 35X1,5	NR	1,000
010.0370	GHIERA 5S 30X1,5	NR	1,000
010.7604	RONDELLA DIAM. 8	NR	2,000
010.7890	VITE TCEI 8 X 12	NR	2,000
010.7932	VITE TCEI 10 X 110	NR	4,000
010.7961	VITE TE 8 X 20	NR	2,000
016.0491	GUIDA SCARICA PEZZI TI 370 CNC	NR	1,000
025.0080	GABBIA ASSIALE A RULLINI AXK 3552	NR	1,000
025.0082	RALLA AS 3552	NR	2,000
034.1001	LEVA A SCATTO 8 MA PK55	NR	1,000

Turntable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010.0542
001.3723
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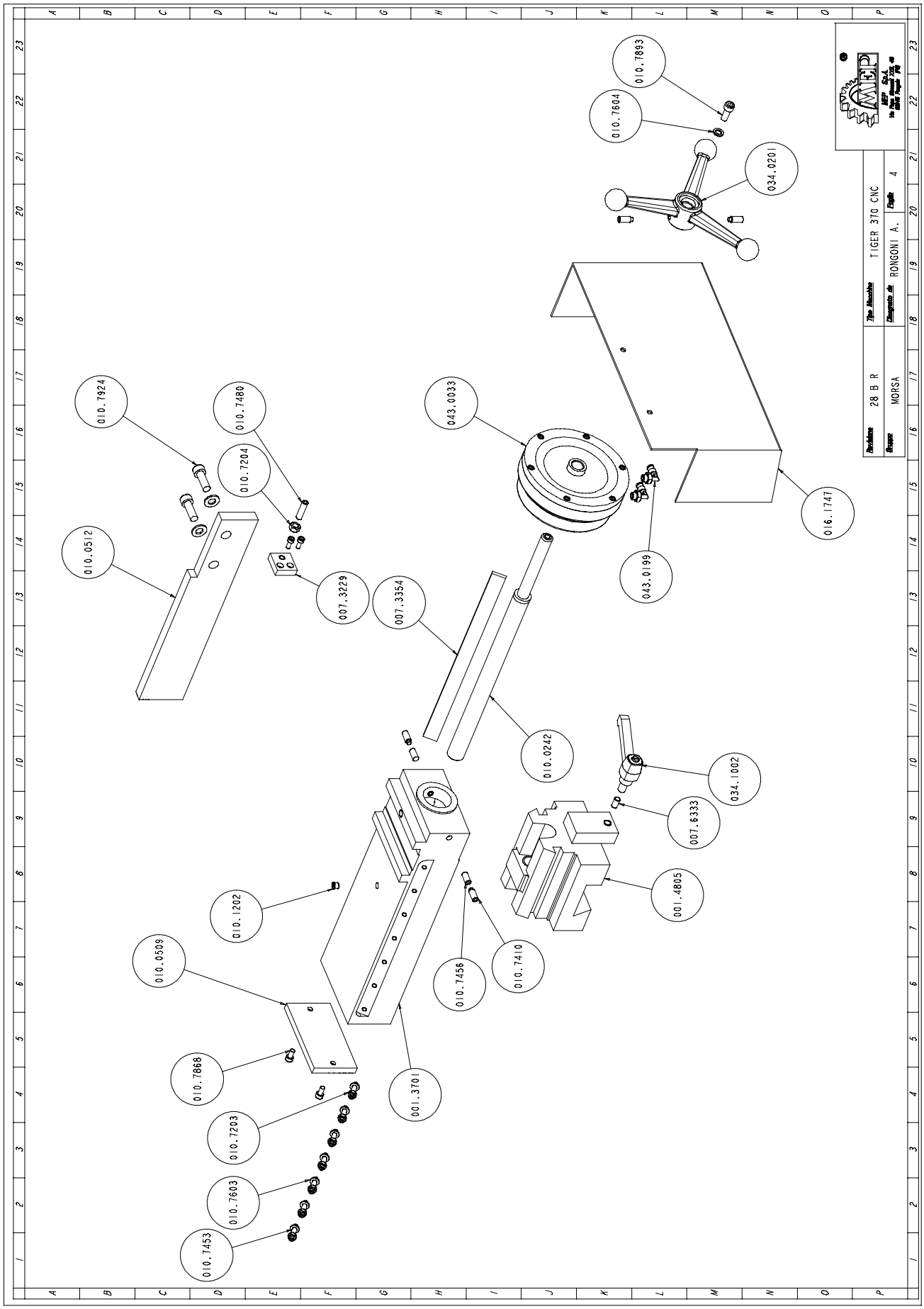
010.0511
010.7965
010.7204
001.4804
22 A R
TIGER 372 SX EVO
PIATTAFORMA ROTANTE
RONGONI A.
3

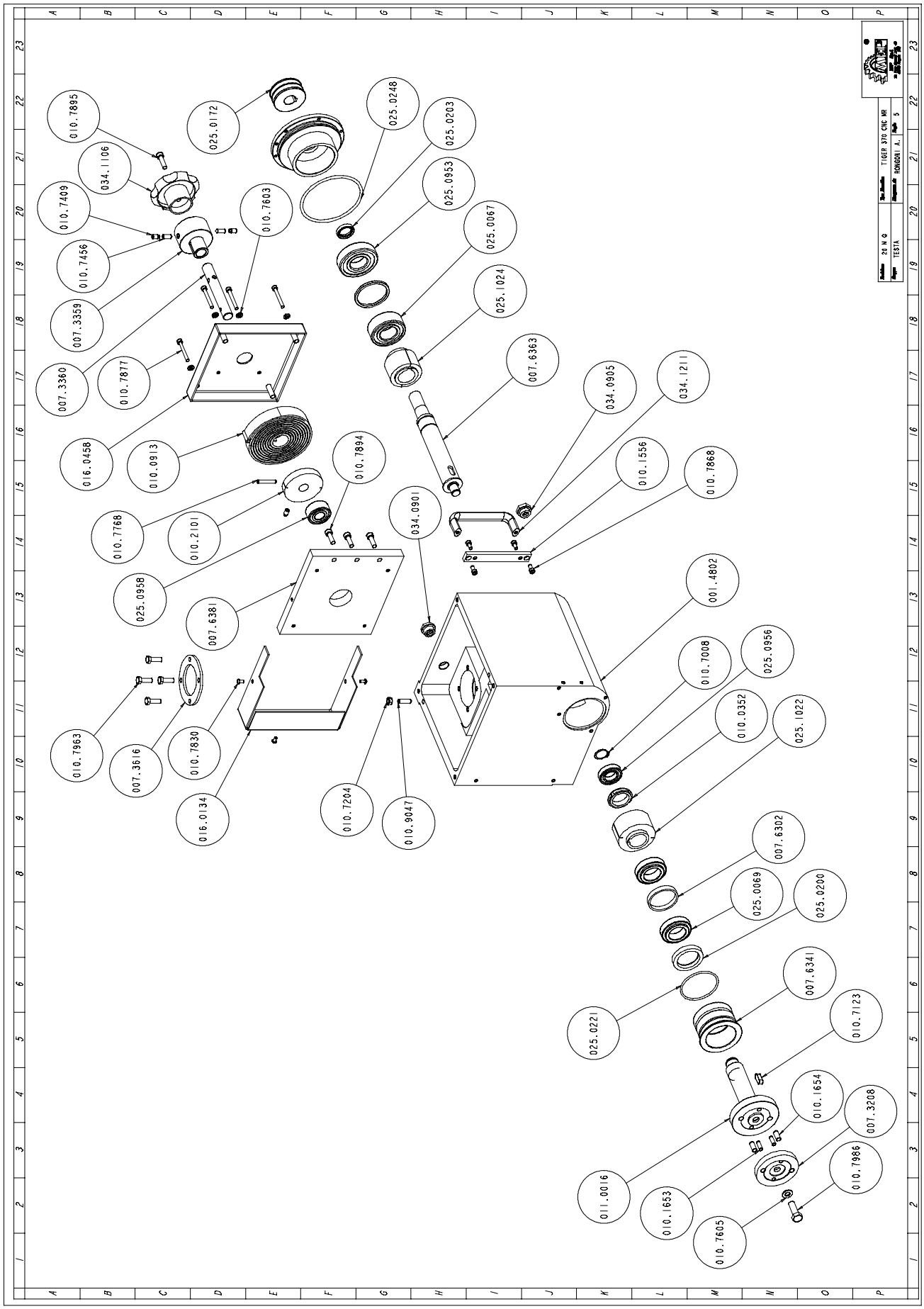
Code	Description	U. of M.	Quantity
001.3709	STAFFA BLOCCAGGIO CILINDRO SUPPLEM.	NR	1,000
001.3723	SUPPORTO CILINDRO SUPPLEMENTARE	NR	1,000
001.4804	PIATTAFORMA ROTANTE	NR	1,000
001.4806	SQUADRO MORSA	NR	1,000
001.4819	COLONNA PORTANTE TI 372 SX	NR	1,000
007.3218	BATTUTA FINECORSA	NR	1,000
007.3234	BOCCOLA/GANASCIA X CILIN.SUPPLEMEN.	NR	1,000
010.0319	VITE 8.8 TCEI 10X140 TI	NR	2,000
010.0511	GANASCIA MORSA SINISTRA	NR	1,000
010.0542	GANASCIA MORSA DESTRA TI 370	NR	1,000
010.1851	BOCCOLA PER CARTER DISCO -DIAM 20	NR	3,000
010.2122	CREMAGLIERA TI 370 CNCFE	NR	1,000
010.2828	GUIDA PATTINO HGW25-HC-2-RO465	NR	1,000
010.2829	GUIDA PATTINO HGW25-HC-2-RO490	NR	1,000
010.7204	DADO M8	NR	2,000
010.7226	DADO AUTOBLOCCANTE M6	NR	3,000
010.7455	GRANO VCE P.CON. 8 X 10	NR	1,000
010.7470	GRANO VCE PUNTA PIANA 6 X 35	NR	3,000
010.7606	RONDELLA DIAM. 12	NR	1,000
010.7661	RONDELLA SPESSORE DIAM. 6 X 3	NR	9,000
010.7830	VITE BUTON 5 X 10	NR	2,000
010.7868	VITE TCEI 6 X 12	NR	4,000
010.7871	VITE TCEI 6 X 20	NR	16,000
010.7872	VITE TCEI 6 X 25	NR	16,000
010.7873	VITE TCEI 6 X 30	NR	2,000
010.7924	VITE TCEI 10 X 30	NR	1,000
010.7926	VITE TCEI 10 X 45	NR	2,000
010.7932	VITE TCEI 10 X 110	NR	1,000
010.7934	VITE TCEI 12 X 50	NR	4,000
010.7941	VITE TCEI 12 X 35	NR	2,000
010.7965	VITE TE 8 X 35	NR	2,000
010.8954	VITE TE 8 X 80	NR	2,000
016.0133	CARTER CREMAGLIERA SOLLEVAMENTO	NR	1,000
043.0041	CILINDRO MORSE 50X10 0 40 L.150 D.E	NR	1,000
043.0199	ATTACCO A GOMITO GIREV.4X1/8 CL6521	NR	2,000

Vice assembly



Code	Description	U. of M.	Quantity
001.3701	SCORREVOLE MORSA	NR	1,000
001.4805	SUPPORTO MORSA M.1755	NR	1,000
007.3229	TASSELLO X BATTUTA SCORR. ANTIBAVA	NR	1,000
007.3354	LARDONE MORSA	NR	1,000
007.6333	PERNO BLOCCAGGIO MORSA TI 370	NR	1,000
010.0242	VITE MORSA	NR	1,000
010.0509	GANASCIA MORSA	NR	1,000
010.0512	GANASCIA ANTIBAVA	NR	1,000
010.1202	OLIATORE A SFERA DIAM. 8	NR	1,000
010.7203	DADO M6	NR	7,000
010.7204	DADO M8	NR	1,000
010.7410	GRANO VCE P.CIL. 8 X 16	NR	4,000
010.7453	GRANO VCE P.CON. 6 X 30	NR	7,000
010.7456	GRANO VCE P.CON. 8 X 16	NR	2,000
010.7480	GRANO VCE PUNTA PIANA 8 X 30	NR	1,000
010.7603	RONDELLA DIAM. 6	NR	7,000
010.7604	RONDELLA DIAM. 8	NR	1,000
010.7868	VITE TCEI 6 X 12	NR	2,000
010.7893	VITE TCEI 8 X 20	NR	1,000
010.7924	VITE TCEI 10 X 30	NR	2,000
016.1747	PROTEZIONE MORSA TI 370	NR	1,000
034.0201	VOLANTINO MORSA GRANDE	NR	1,000
034.1002	LEVA A SCATTO 10 MA	NR	2,000
043.0033	CILINDRO VOLAMPRESS 125-8	NR	1,000
043.0199	ATTACCO A GOMITO GIREV.4X1/8 CL6521	NR	2,000

Head unit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010.7204
010.9047
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010.7894
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025.0203
025.0953
025.0067
025.1024
007.6363
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034.1211
010.1556
010.7868
001.4802
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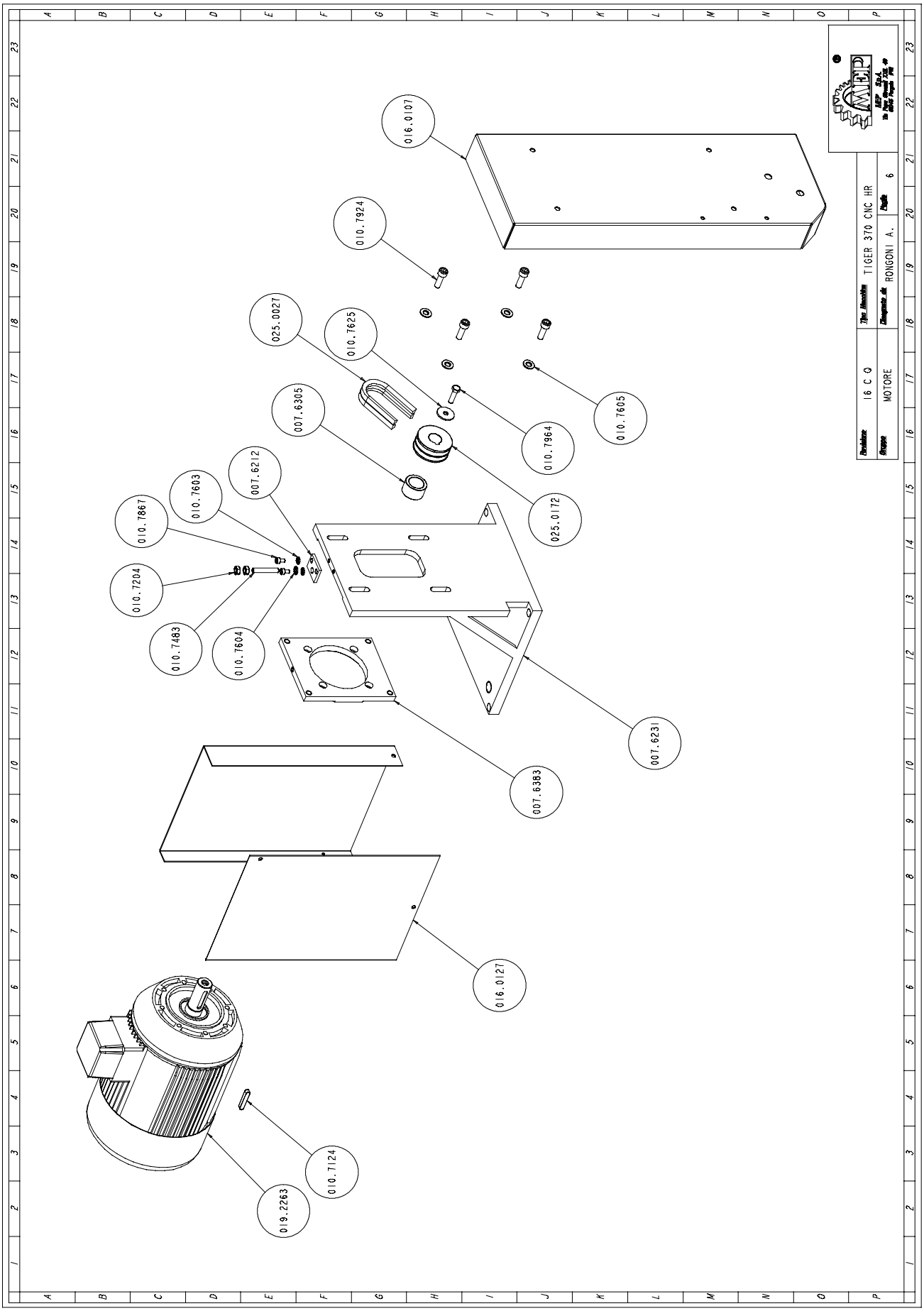
010.0352
025.1022
007.6302
025.0069
025.0200
007.6341
010.7123
025.0221
010.1654
007.3208
010.7986
011.0016
010.1653
010.7605
20 M Q
TESTA
TIGER 370 CNC MR
MONDOVI' A.
5

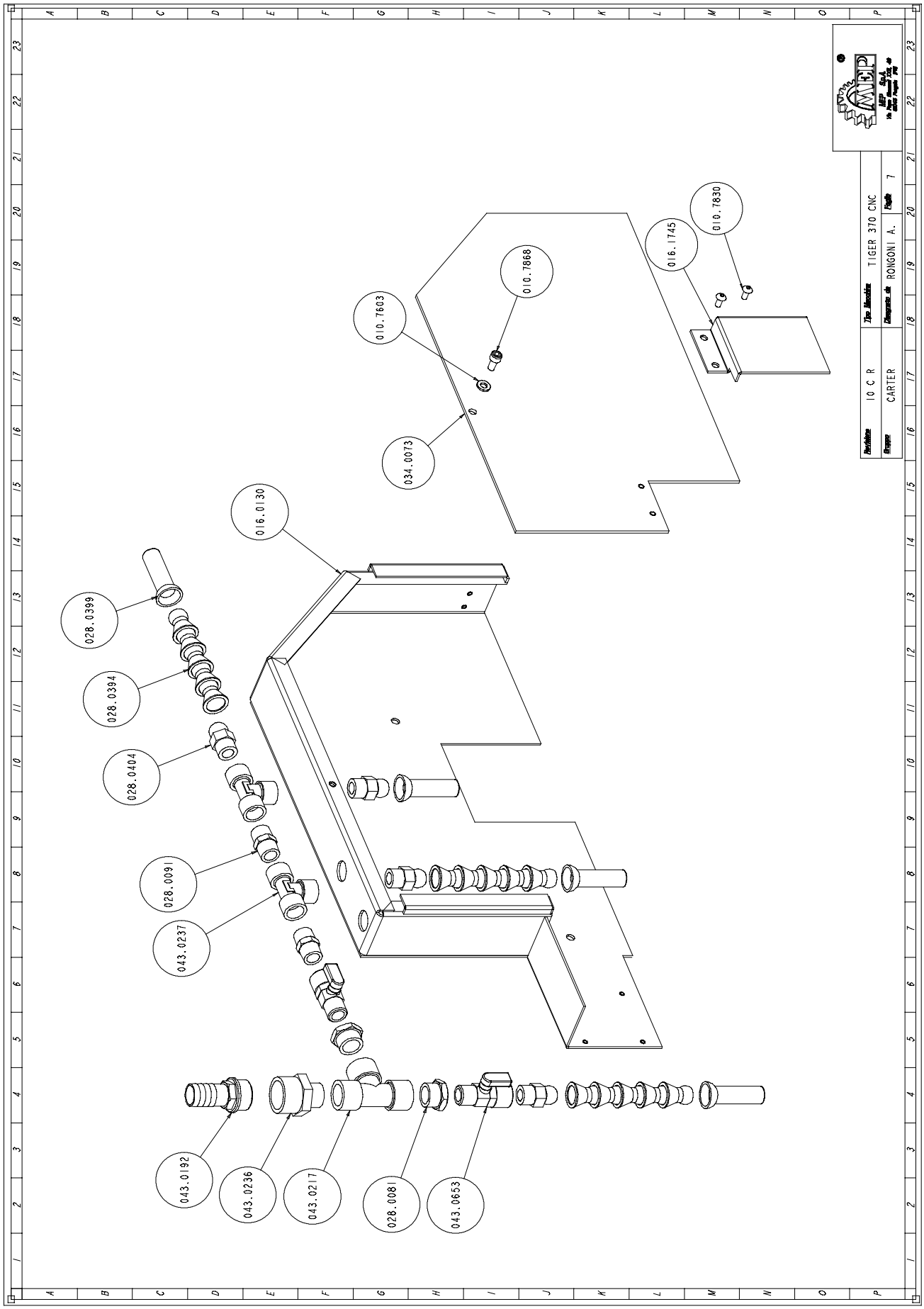
Code	Description	U. of M.	Quantity
001.4802	TESTA OPERATRICE	NR	1,000
007.3208	FLANGIA ESTERNA	NR	1,000
007.3359	BOCCOLA RIPRESA CORSA	NR	1,000
007.3616	GHIERA FIX CUSCINETTO	NR	1,000
007.6302	DISTANZIALE IØ STADIO TI 370 CNCFE	NR	1,000
007.6341	TAMPONE IØ STADIO RIDUZIONE	NR	1,000
007.6362	ALBERO MOVIMENTO TESTA TI 370 CNCFE	NR	1,000
007.6363	ALBERO D.35 IIØ STADIO TI 370 CNCFE	NR	1,000
007.6381	FLANGIA PORTAMOLLA RICHIAMO TESTA	NR	1,000
010.0352	GHIERA AUTOBLOCCANTE 35X1,5	NR	2,000
010.0913	MOLLA SOLLEVAMENTO TESTA	NR	1,000
010.1201	VITERIA E BULLONERIA	NR	5,000
010.1556	STAFFA FISSAGGIO MANIGLIA TESTA	NR	1,000
010.1653	PERNO FLANGIA	NR	2,000
010.1654	PERNO FLANGIA	NR	2,000
010.2101	RUOTA SOLLEVAMENTO TESTA	NR	1,000
010.7008	ANELLO SEEGER DIAM. 25	NR	1,000
010.7123	CHIAVETTA 10 X 8 X 25	NR	3,000
010.7204	DADO M8	NR	1,000
010.7409	GRANO VCE P.CIL. 8 X 10	NR	3,000
010.7456	GRANO VCE P.CON. 8 X 16	NR	2,000
010.7603	RONDELLA DIAM. 6	NR	4,000
010.7605	RONDELLA DIAM. 10	NR	1,000
010.7768	SPINA ELASTICA DIAM. 6 X 40	NR	1,000
010.7830	VITE BUTON 5 X 10	NR	3,000
010.7868	VITE TCEI 6 X 12	NR	4,000
010.7877	VITE TCEI 6 X 45	NR	4,000
010.7894	VITE TCEI 8 X 25	NR	3,000
010.7895	VITE TCEI 8 X 30	NR	1,000
010.7963	VITE TE 8 X 25	NR	4,000
010.7986	VITE TE 12 X 35	NR	4,000
010.9047	GRANO VCE P.CON. 8 X 25	NR	1,000
011.0016	ALBERO PORTADISCO TI 370	NR	1,000
016.0134	CARTER RUOTA SOLLEVAMENTO TESTA DI TAGLIO	NR	1,000
016.0458	COPERCHIO MOLLA	NR	1,000
025.0067	CUSCINETTO 3207A	NR	1,000
025.0069	CUSCINETTO 32007X	NR	2,000
025.0172	PULEGGIA 60X2	NR	1,000
025.0200	ANELLO TENUTA 62X45X10	NR	1,000
025.0203	ANELLO DI TENUTA 35X25X7	NR	1,000
025.0221	ANELLO DI TENUTA OR 176	NR	1,000
025.0248	ANELLO DI TENUTA OR PARKER 2-351	NR	1,000
025.0953	CUSCINETTO 6307	NR	1,000
025.0956	CUSCINETTO 6005	NR	1,000
025.0958	CUSCINETTO 3204 A 2RS	NR	1,000
025.1022	RUOTA ELIC.CILINDR.ALBERO MANDRINO	NR	1,000
025.1024	RUOTA ELICOIDALE CILINDR.IIØSTADIO	NR	1,000
034.0901	TAPPO LIVELLO OLIO 1/2 "GAS.	NR	1,000
034.0905	TAPPO OLIO TAO/3 1/2" NERO	NR	1,000
034.1106	VOLANTINO DIAM.100 A 6 LOBI	NR	1,000
034.1211	MANIGLIA GN-565-20-128.SW	NR	1,000

Motor assembly



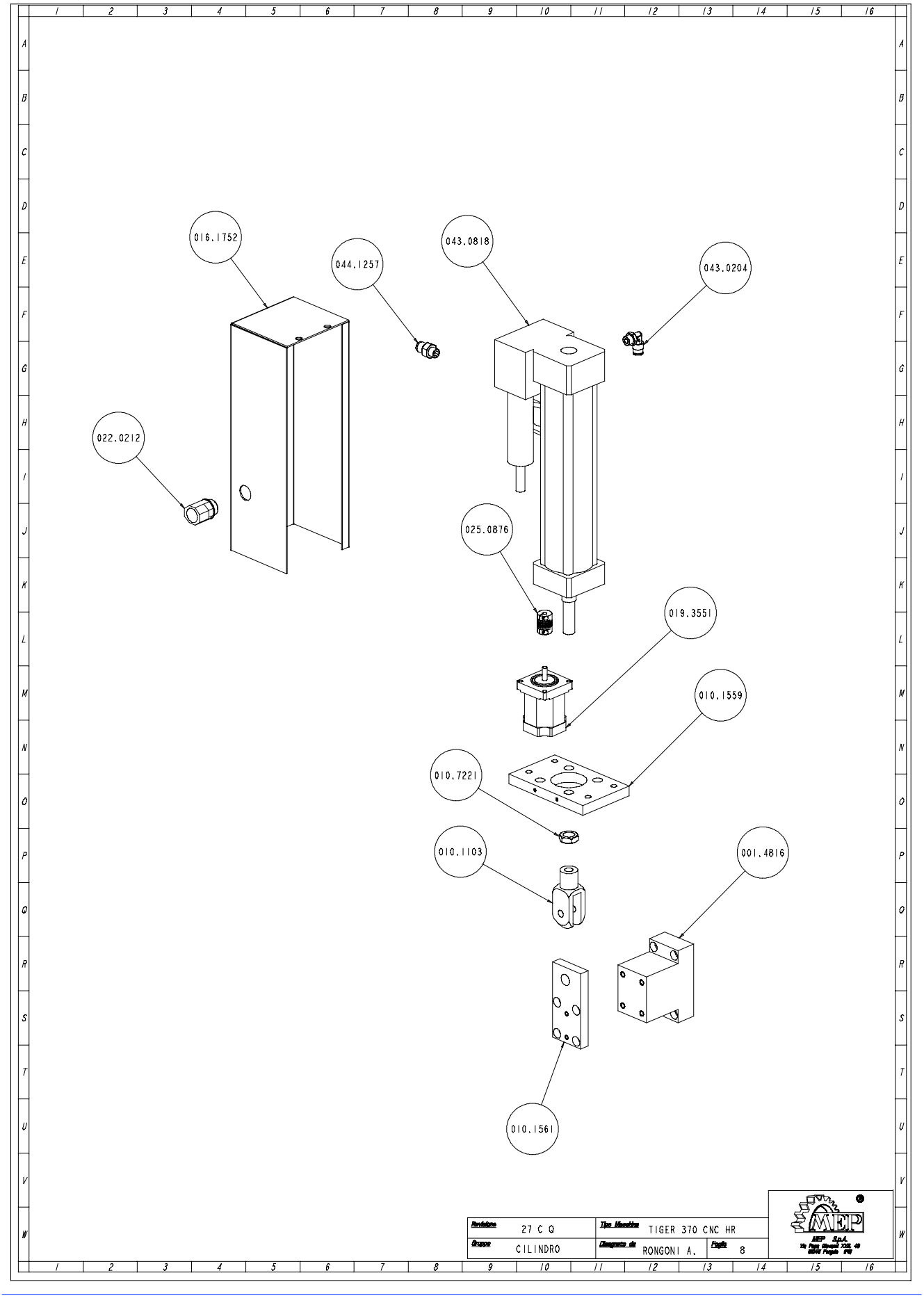
Code	Description	U. of M.	Quantity
007.6212	PIASTRINO X REGOLAZIONE POSIZI	NR	1,000
007.6231	SQUADRO SUPPORTO MOTORE TI 370	NR	1,000
007.6305	DISTANZIALE PULEGGIA MOTORE TI	NR	1,000
007.6383	FLANGIA MOTORE REGOLABILE TI 3	NR	1,000
010.7124	CHIAVETTA 8 X 7 X 45	NR	1,000
010.7204	DADO M8	NR	2,000
010.7483	GRANO VCE PUNTA PIANA 8X50	NR	1,000
010.7603	RONDELLA DIAM. 6	NR	2,000
010.7604	RONDELLA DIAM. 8	NR	1,000
010.7605	RONDELLA DIAM. 10	NR	4,000
010.7625	RONDELLA DIAM. 8 X 32	NR	1,000
010.7867	VITE TCEI 6 X 10	NR	2,000
010.7924	VITE TCEI 10 X 30	NR	4,000
010.7964	VITE TE 8 X 30	NR	1,000
016.0107	CARTER CINGHIA DI TRASMISSIONE	NR	1,000
016.0127	CARTER MOTORE TI 370 CNCHR	NR	1,000
019.2263	KW 4,4/3,3 2/4P.B.14 GR112 V.	NR	1,000
025.0027	CINGHIA SPZ 1180	NR	2,000
025.0172	PULEGGIA 60X2 SPZ FORO 24	NR	1,000

Blade guard unit



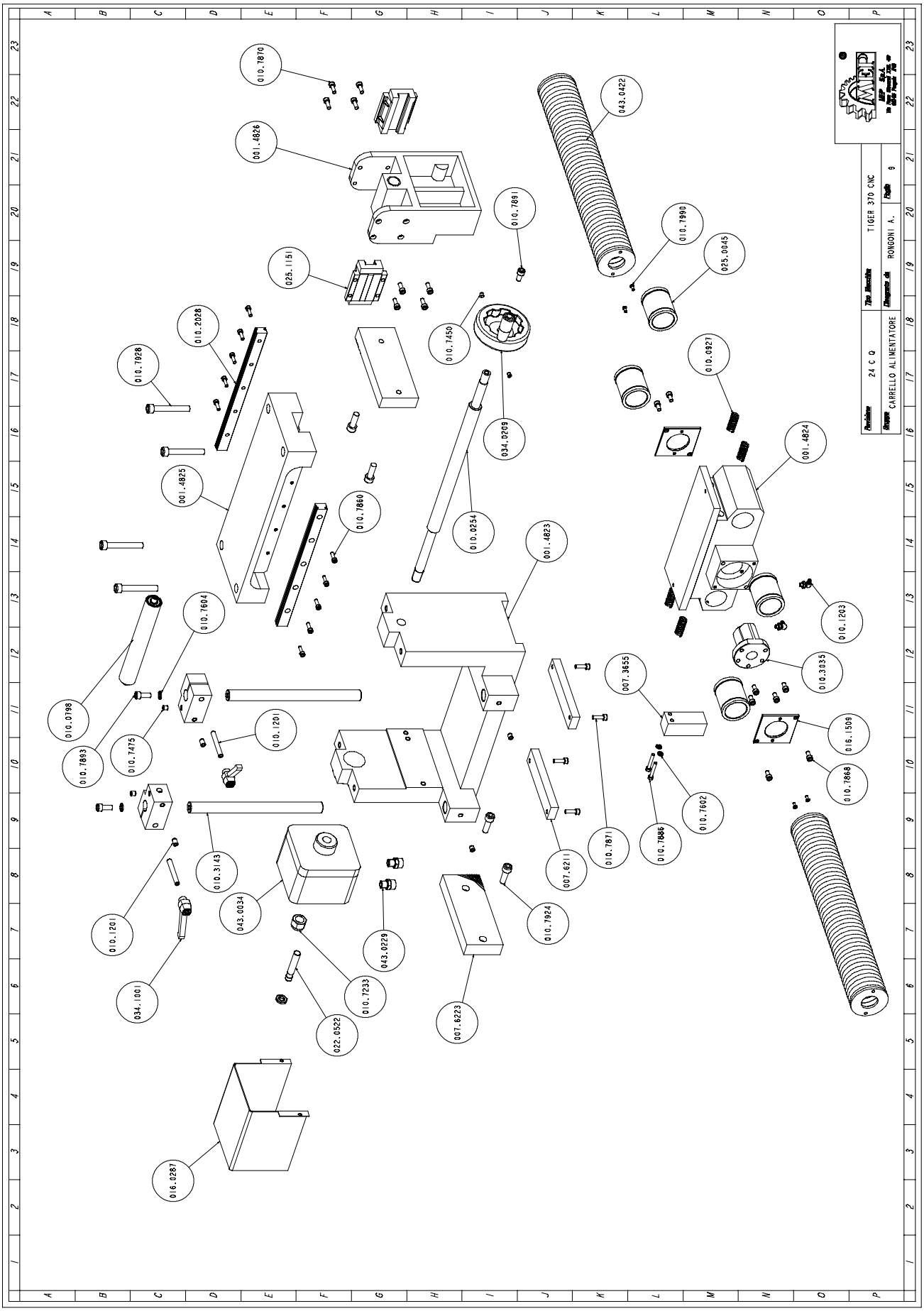
Code	Description	U. of M.	Quantity
010.7603	RONDELLA DIAM. 6	NR	1,000
010.7830	VITE BUTON 5 X 10	NR	2,000
010.7868	VITE TCEI 6 X 12	NR	1,000
016.0130	CARTER DISCO TI 370 CNCFE	NR	1,000
016.1745	PROTEZIONE SPAZZOLA PULILAMA TI	NR	1,000
028.0081	RIDUZIONE FM 1/2-3/8 - CL 2531	NR	2,000
028.0091	NIPPLO 3/8" - CL 2500	NR	2,000
028.0394	TUBO LOOC LINE 1/2 ART. 59861	MT	3,000
028.0399	UGELLO 0 12,7 - 1/2 ART. 59863	NR	4,000
028.0404	RACCORDO 3/8 NPT LOOC LINE 1/2	NR	4,000
034.0073	PROTEZIONE LEXAN CARTER LAMA TI 370	NR	1,000
043.0192	RACCORDO RB 9889 3/4X20	NR	1,000
043.0217	RACCORDO A "T" FFF 1/2	NR	1,000
043.0236	RIDUZIONE M 1/2-F 3/4 ZINCATA	NR	1,000
043.0237	RACCORDO A T FFF 3/8	NR	2,000
043.0653	RUBINETTO M/F 3/8 CL 6310	NR	2,000

Electro-cylinder unit



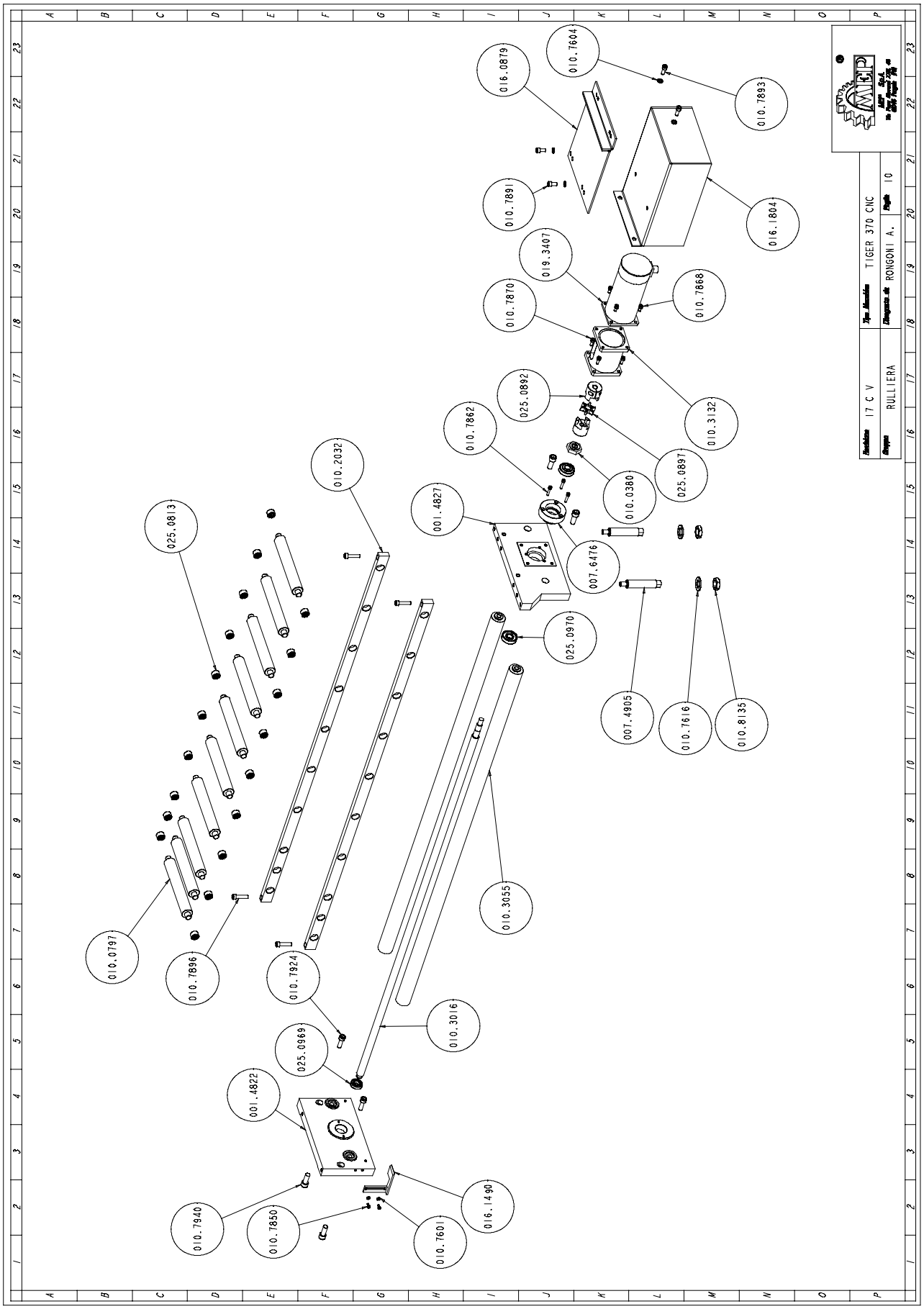
Code	Description	U. of M.	Quantity
001.4816	.SUPPORTO AGGANCIO CILINDRO TI	NR	1,000
010.1103	FORCELLA 16 X 1,5	NR	1,000
010.1559	STAFFA FISSAGGIO CILINDRO TI 3	NR	1,000
010.1561	STAFFA AGGANCIO CILINRO TI 370	NR	1,000
010.7221	DADO M16 BASSO	NR	1,000
016.1752	PROTEZIONE CILINDRO	NR	1,000
019.3551	MOTORE MAE MOD.HY 200 2232 190	NR	1,000
022.0212	RACCORDO RAPIDO SEM PG 16	NR	1,000
022.0378	CONNETT.BOBINA VALV. RIGENERAT	NR	1,000
025.0876	GIUNTO WA 6-6 MM.28 X CILINDRO	NR	1,000
043.0204	ATTACCO A GOMITO 8X1/4 - CL 65	NR	1,000
043.0818	UNITA' IDROPNEUMATICA 63RBXRSM	NR	1,000
044.1257	VALVOLA DI CARICO CILINDRO	NR	1,000

Supply carriage unit



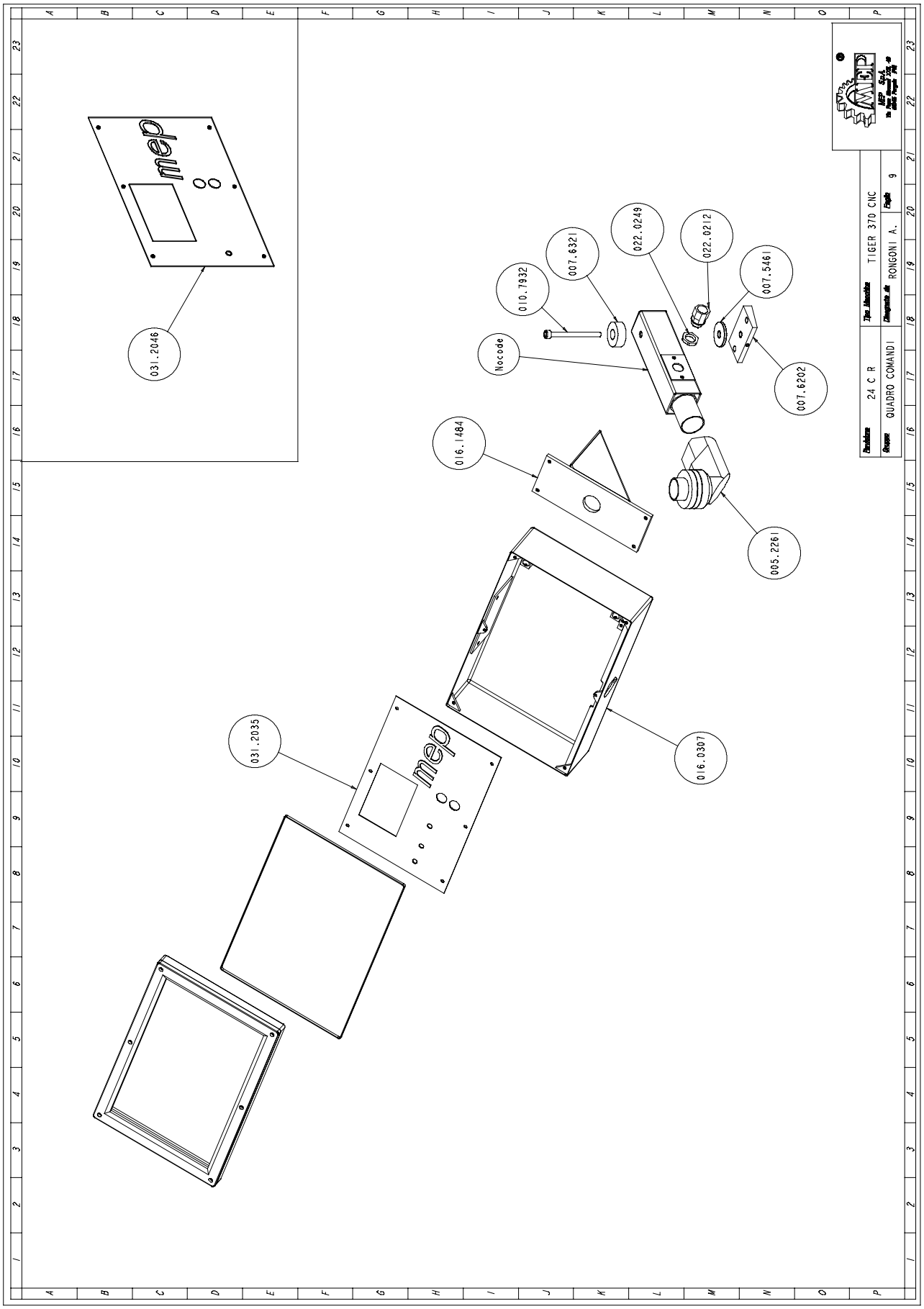
Code	Description	U. of M.	Quantity
001.4823	SLITTA BASCULANTE ALIMENTATORE	NR	1,000
001.4824	CARRELLO ALIMENTATORE	NR	1,000
001.4825	TRAVERSA SLITTA BASCULANTE ALIMETA-	NR	1,000
001.4826	STAFFA FISSAGGIO GANASCIA MOBILE	NR	1,000
007.3471	TASSELLO FISSAGGIO RULLO PREMIBARRA	NR	2,000
007.3655	SUPPORTO CATENA PORTACAVI CN 90	NR	1,000
007.6211	PIASTRINO REGOLAZIONE SLITTA BASCU-	NR	2,000
007.6223	GANASCIA ALIMENTATORE	NR	2,000
010.0254	VITE MORSA ALIMENTATORE 535X24 TI	NR	1,000
010.0798	RULLO PREMIBARRA ALIMENTATORE TI ME	NR	1,000
010.0927	MOLLA CARRELLO ALIMENTATORE	NR	4,000
010.1201	VITERIA E BULLONERIA	NR	4,000
010.1203	OLIATORE A 90Ø 6X1	NR	2,000
010.2028	GUIDA PATTINO LGR20-280	NR	2,000
010.3035	CHIOCCIOLA RNFTL2010A25S	NR	1,000
010.3143	SUPPORTO RULLO PREMIBARRA	NR	2,000
010.7233	DADO AUTOBLOCCANTE M16	NR	1,000
010.7450	GRANO VCE P.CIL. 6 X 6	NR	2,000
010.7475	GRANO VCE P.PIANA 8 X 8	NR	4,000
010.7602	RONDELLA DIAM. 5	NR	2,000
010.7604	RONDELLA DIAM. 8	NR	1,000
010.7860	VITE TCEI 5 X 15	NR	10,000
010.7868	VITE TCEI 6 X 12	NR	8,000
010.7870	VITE TCEI 6 X 16	NR	8,000
010.7871	VITE TCEI 6 X 20	NR	4,000
010.7886	VITE TCEI 5 X 35	NR	2,000
010.7891	VITE TCEI 8 X 16	NR	1,000
010.7893	VITE TCEI 8 X 20	NR	1,000
010.7924	VITE TCEI 10 X 30	NR	4,000
010.7928	VITE TCEI 10 X 70	NR	4,000
010.7990	VITE TSPEI 4 X 8	NR	4,000
016.0287	PROTEZIONE VOLAMPRESS	NR	1,000
016.1509	STAFFA FIX SOFFIETTO CIRCOLARE	NR	2,000
022.0523	SENSORE DI PROSSIMITA' PNP	NR	1,000
025.0045	MANICOTTO A RIC.SFERE LBBS12-2LS	NR	4,000
025.1151	PATTINO LGW20HAZ1C	NR	2,000
034.0209	VOLANTINO VDO.100 ALIMENTATORE	NR	1,000
034.1001	LEVA A SCATTO 8 MA PK55	NR	2,000
043.0034	CILINDRO VOLAMPRESS 100-8 ALIM.	NR	1,000
043.0229	RIDUZIONE MF 1/4 - CL 2520	NR	2,000
043.0422	SOFFIETTO CIRCOLARE ALIMENTATORE	NR	2,000

Supply roller unit



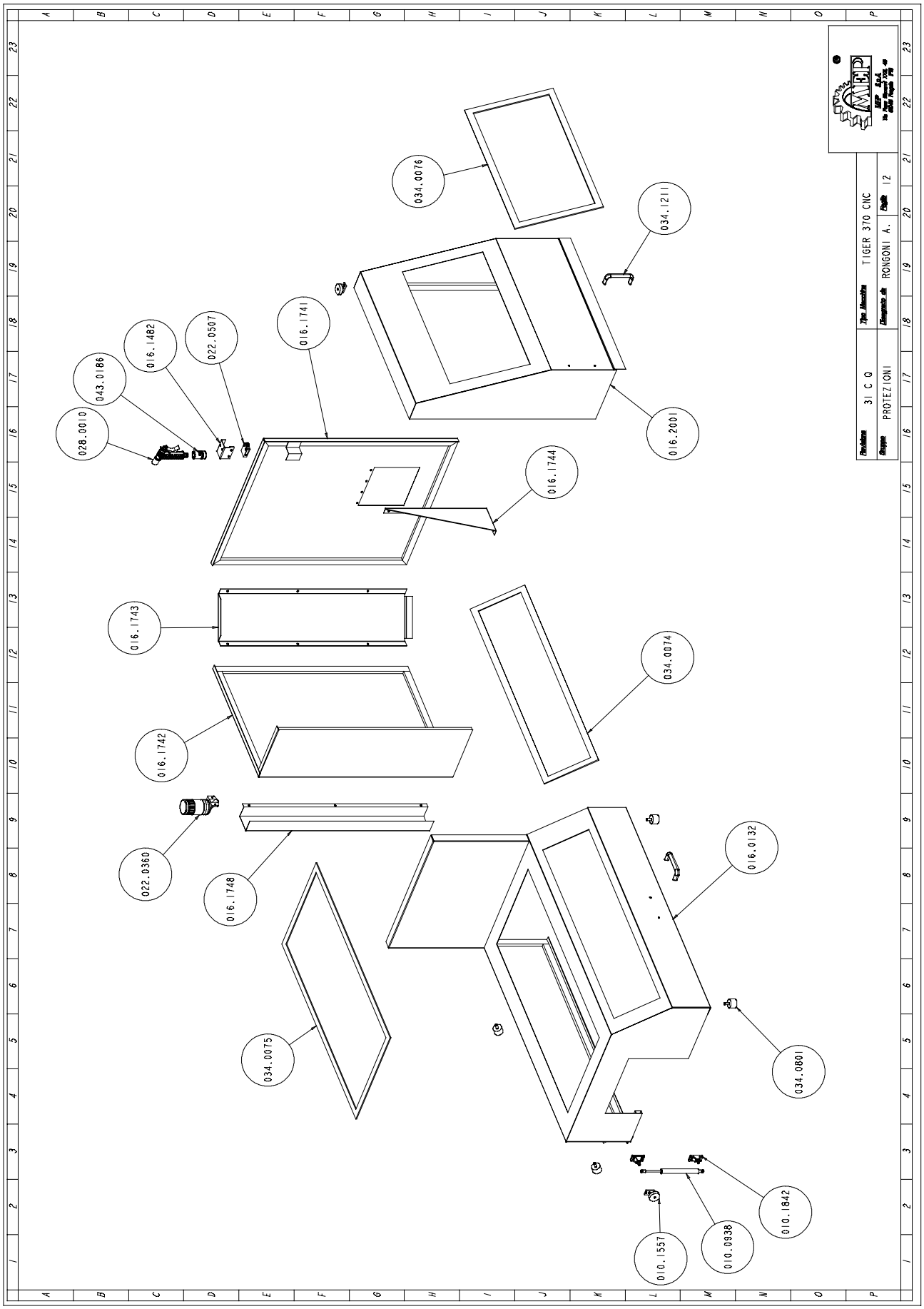
Code	Description	U. of M.	Quantity
001.4821	STAFFA POSTERIORE ALIMENTATORE	NR	1,000
001.4822	STAFFA ANTERIORE ALIMENTATORE	NR	1,000
007.3656	SUPPORTO MOTORE P/P ALIMENTATORE	NR	1,000
007.3731	GIUNTO MOTORE ALIMENTATORE CN 90	NR	1,000
007.4905	SUPPORTO ALIMENTATORE SH 400	NR	2,000
010.0797	RULLO ALIMENTATORE	NR	10,000
010.1201	VITERIA E BULLONERIA	NR	2,000
010.2032	GUIDA RULLI ALIMENTATORE	NR	2,000
010.3006	VITE A RICIRCOLO DI SFERE 0 20 P.10	NR	1,000
010.3055	GUIDA CARRELLO 0 40 MM.1283	NR	2,000
010.3147	SUPPORTO VITE RULLATA	NR	1,000
010.7232	DADO AUTOBLOCCANTE M14	NR	1,000
010.7601	RONDELLA DIAM. 4	NR	2,000
010.7604	RONDELLA DIAM. 8	NR	4,000
010.7616	RONDELLA DIAM. 21	NR	2,000
010.7830	VITE BUTON 5 X 10	NR	2,000
010.7850	VITE TCEI 4 X 8	NR	2,000
010.7861	VITE TCEI 5 X 20	NR	4,000
010.7868	VITE TCEI 6 X 12	NR	8,000
010.7870	VITE TCEI 6 X 16	NR	4,000
010.7871	VITE TCEI 6 X 20	NR	4,000
010.7891	VITE TCEI 8 X 16	NR	2,000
010.7893	VITE TCEI 8 X 20	NR	2,000
010.7896	VITE TCEI 8 X 35	NR	4,000
010.7924	VITE TCEI 10 X 30	NR	2,000
010.7940	VITE TCEI 12 X 30	NR	4,000
016.0879	ADATTATORE DI CARICO PIANALE K 35	NR	1,000
016.1490	STAFFA COMANDO MICROINTERRUTT.CN 90 TI 370 CNCFE	NR	1,000
016.1733	PROTEZIONE CAVO FINECORSA CN 90	NR	1,000
016.1736	PROTEZIONE MOTORE ALIMENTATORE	NR	1,000
019.3401	MOTORE P/P KS200-085,3-R00,20 ALIM.	NR	1,000
025.0813	BOCCOLA A RULLINI INA HK 1512	NR	20,000

Control panel



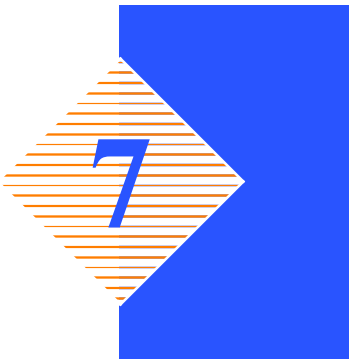
Code	Description	U. of M.	Quantity
005.2261	GIUNTO ANGOLO X QUADRO 497500	NR	1,000
007.5461	ROSETTA ASTA MOBILE SH 420 SE	NR	1,000
007.6202	PIASTRA FISSAGGIO ASTA MOBILE	NR	1,000
007.6321	ROSETTA BLOCCAGGIO ASTA MOBILE	NR	1,000
010.7932	VITE TCEI 10 X 110	NR	1,000
016.0235	ASTA MOBILE X CONSOLLE TI 370	NR	1,000
016.0307	QUADRO COMANDI MEP-E	NR	1,000
016.1484	STAFFA FISSAGGIO CONSOLLE SH 4	NR	1,000
022.0212	RACCORDO RAPIDO SEM PG 16	NR	1,000
022.0249	DADO POLIAM.HUMMEL 1.262.1600.	NR	1,000
031.2046	CONSOLLE PROGRAMMAZIONE	NR	1,000

Guard rail


034.0076
034.1211
016.1741
016.1482
022.0507
043.0186
028.0010
016.2001
016.1744
016.1743
034.0074
016.1742
022.0360
016.1748
016.0132
034.0075
034.0801
010.1842
010.0938
010.1557
TIGER 370 CNC
RONGONI A.
PROTEZIONI
3 I C Q

Code	Description	U. of M.	Quantity
010.0938	MOLLA GAS 120MM.	NR	1,000
010.1557	STAFFA COMANDO F.C.PROTEZIONE TI370	NR	2,000
010.1842	SUPPORTO MASCHIO X MOLLA A GAS	NR	2,000
016.0132	CARTER ALIMENTATORE TI 370	NR	1,000
016.1482	STAFFA FISSAGGIO FINECORSA SPORTEL-	NR	1,000
016.1741	PROTEZIONE LATERALE TI 370	NR	1,000
016.1742	PROTEZIONE POSTERIORE TI 370	NR	1,000
016.1743	PROTEZIONE ANGOLO TI 370	NR	1,000
016.1744	RINFORZO PROTEZIONE LATERALE TI 370	NR	1,000
016.1748	PROTEZIONE CAVI TI 370 CNC	NR	1,000
016.2001	SPORTELLO PROTEZIONE MACCHINA TI370	NR	1,000
022.0360	LAMPEGGIANTE	NR	1,000
022.0507	FINECORSA D4C-1G02 1M	NR	1,000
028.0010	PISTOLA	NR	1,000
034.0074	PROTEZ.LEXAN CARTER ALIM.FRONTALE	NR	1,000
034.0075	PROTEZIONE LEXAN CARTER ALIMENTATO-	NR	1,000
034.0076	PROTEZIONE LEXAN X SPORTELLO MACCHI	NR	1,000
034.0801	ARRESTO ELASTICO P 40/30	NR	4,000
034.1211	MANIGLIA GN-565-20-128.SW	NR	2,000
043.0186	RACCORDO FEMMINA 1/2 AQUASTOP	NR	1,000

Adjustments

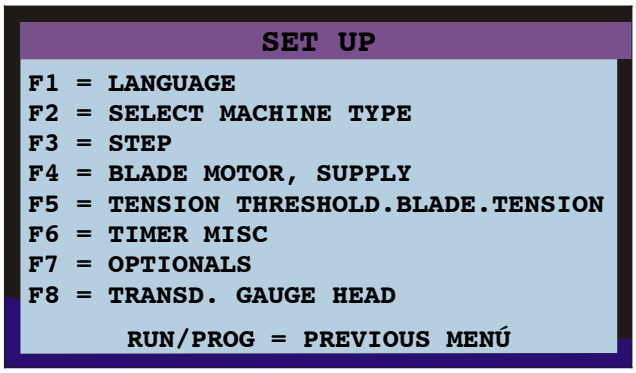


This chapter describes the adjustment operations of the electronic, mechanic and pneumatic systems. These indications will help you to customize your machine for the cut to be executed, thus improving operations.

Displaying and editing the set-up parameters

The machine set–up parameters may be programmed directly from the control console. Set–up parameters vary according to the machine, an envelope containing all the standard set–up values can be found inside the control panel.

- Connect the power supply;
- press F1;
- enter the password by typing: 734533 (the numbers are displayed as black rectangles), press ENTER and the machine set–up page will be displayed on the screen.



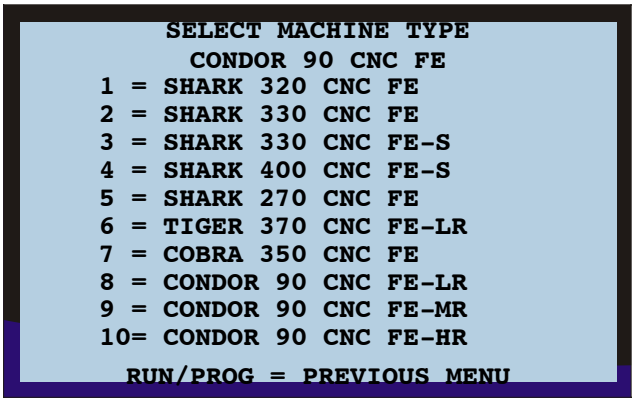
Set language parameter

- Press F1 to access language SET UP, select relative number and press ENTER to confirm;

- press RUN/PROG to return to previous menu.

Set parameter for machine type

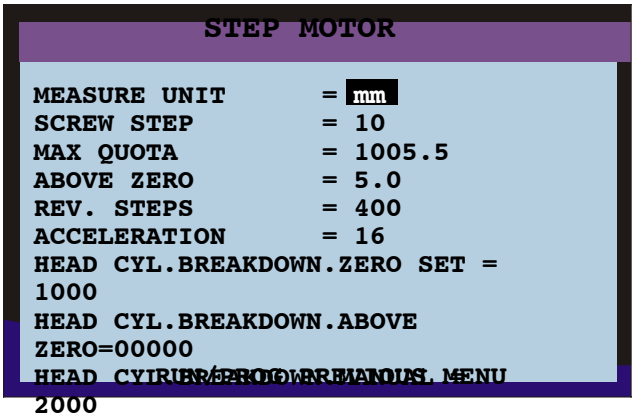
▶ Press F2 to enter SET UP, select machine type, select relative number and press ENTER to confirm.


SELECT MACHINE TYPE
CONDOR 90 CNC FE
1 = SHARK 320 CNC FE
2 = SHARK 330 CNC FE
3 = SHARK 330 CNC FE-S
4 = SHARK 400 CNC FE-S
5 = SHARK 270 CNC FE
6 = TIGER 370 CNC FE-LR
7 = COBRA 350 CNC FE
8 = CONDOR 90 CNC FE-LR
9 = CONDOR 90 CNC FE-MR
10= CONDOR 90 CNC FE-HR
RUN/PROG = PREVIOUS MENU

▶ Press RUN/PROG to return to PREVIOUS MENU.

Set parameter for step motor

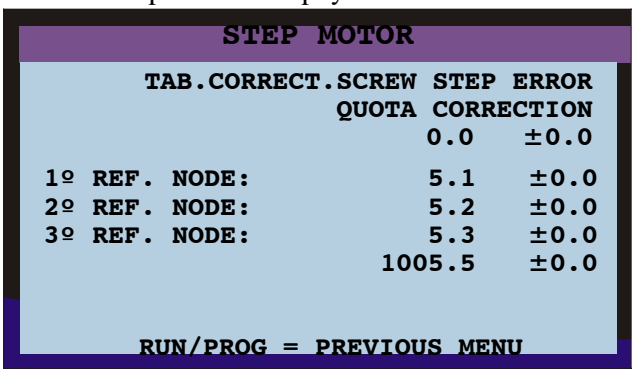
▶ Press F3 to enter step motor SET UP.



HEAD CYL.BREAKDOWN.MAX.FOR-WARD=6000
HEAD CYL.BREAKDOWN.MAX RE-VERSE=6000

▶ Set parameters highlighted on display and press ENTER each time to confirm and change subject; use numerical keys to set numerical values and press F1 or F2 to set unit measures such as mm or inches.

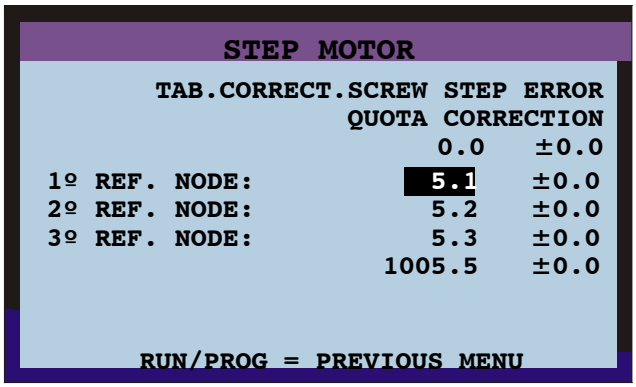
▶ Press RUN/PROG. to return to PREVIOUS MENU. Or press ENTER, to enter second SET UP step motor dislpay.



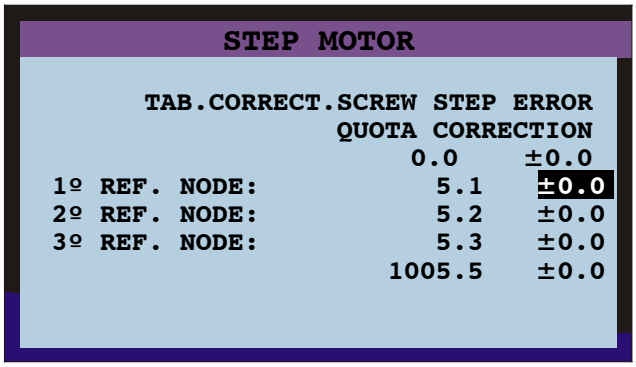
▶ We can now correct the measurement error of the fed material. This adjustment is to be carried out when the cut is longer or shorter than the value indicated by the machine. By increasing the screw step correction value (diplayed

on the right) we can compensate for any errors due to wearing of the screw in the following way:

▶ the cursor is automatically positioned on the first node, set the required quota and press ENTER;



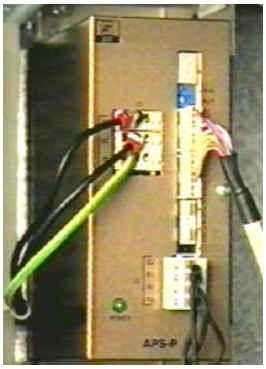
▶ the cursor then moves to the corretion value: if the actual piece measurement is lower, press and add the difference; if the measurement is higher, press to subtract the correction value;



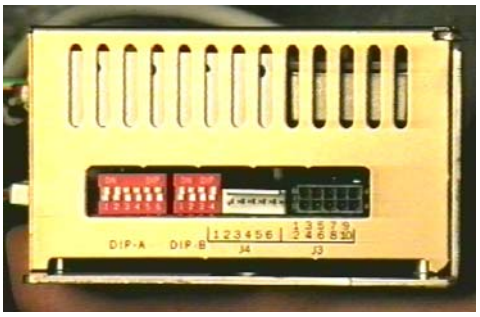
▶ proceed in the same way for the other nodes. The machine automatically assumes the value of the last node and therefore the correction value must be added.

The machine may have the STEP−MOTOR screw at 5 or 10mm steps. To change the SCREW STEP which is set in the above screen at 5 mm (full step) with REV. STEP = 200, both the SET−UP screen and the STEP−MOTOR driver must be configured.

▶ For this adjustment, the machine must be on: identify the STEP MOTOR driver in the electric cabinet.



▶ The dip switches at the top are used for the configuration;

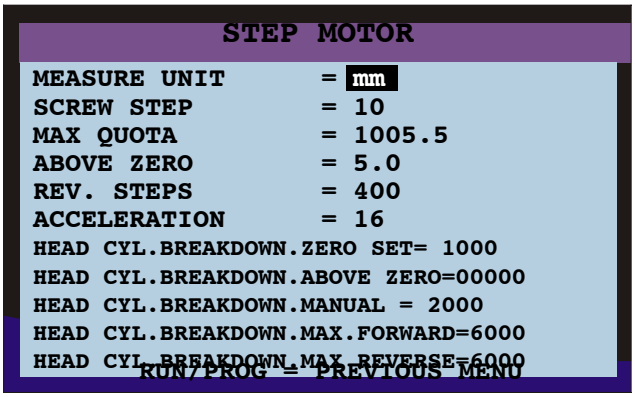


- The fourth dip−switch in the bench B, together with the RV6 potentiometer, determines the current values for the feeder step motor: set the dip−switch ON.
- Rotate the trimmer RV6 till displaying 0, which corresponds to a 10−A current.
- Set again the dip−switch B−4 OFF.

SURFACE B CONFIGURATION				
1	2	3	4	**SCREW PITCH**
OFF	ON	ON	OFF	5

N.B. Chapter 6 contains the tables which illustrate the allowable configurations of the driver.

- Set the current screw step values on the control console: e.g. SCREW−STEP = 10 (1/2 step) and REV. STEP = 400.
- The driver can now be carefully put back into its original position. Restore the machine.

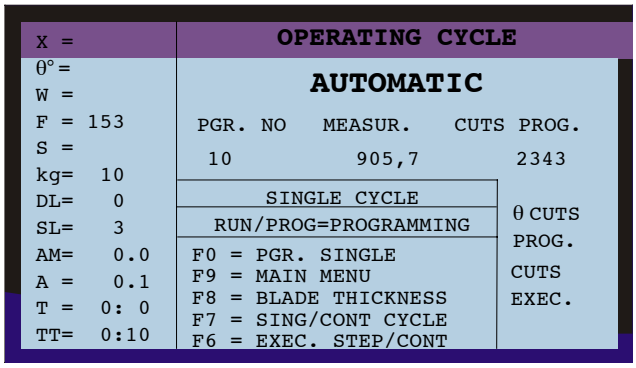


▶ Press RUN/PROG to return to PREVIOUS MENU.

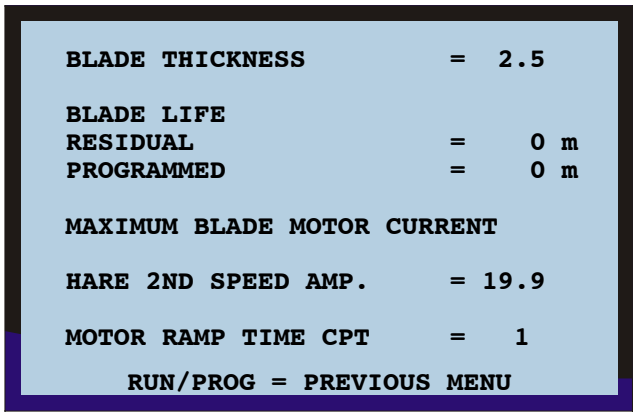
N.B. The “MAX. UPSTROKE SPEED” parameter must be 2000 when the machine is connected to the bar store.

Setting blade characteristics, head downstroke speed and bar initializing

These parameters are accessed by pressing F8 on the work video pages of the automatic cycle.



▶ Press F8 to display the SET UP in order to set: the blade thickness expressed in millimeters, the programmed and residual life of the tool, the maximum current of the blade motor, the opening speed of the cutting head downstroke valve, the size of the bar initialization.


BLADE THICKNESS = 2.5
BLADE LIFE
RESIDUAL = 0 m
PROGRAMMED = 0 m
MAXIMUM BLADE MOTOR CURRENT
HARE 2ND SPEED AMP. = 19.9
MOTOR RAMP TIME CPT = 1
RUN/PROG = PREVIOUS MENU

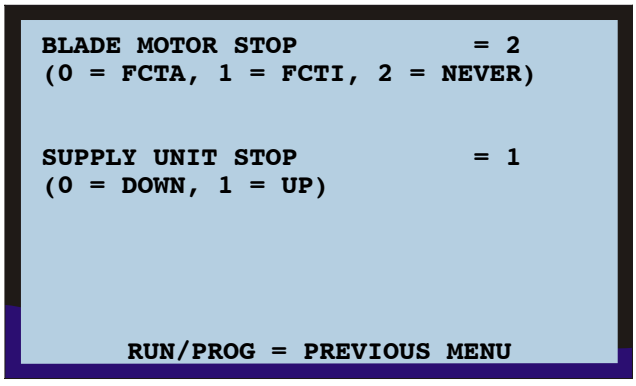
▶ To enter data, move and confirm by pressing ENTER.

▶ Press RUN/PROG to return to PREVIOUS MENU.

Blade motor and supply unit setting

The Blade Motor Stop parameter can be used to stop the blade in the FCTA (Head Forward Travel Limit) position, the FCTI (Head Back Travel Limit) position, or in no position at all. The Park Feeder parameter is used to stop the feeder carriage forward (near the cutting vice) or back (as during normal machine operation).

▶ From the SET UP menu press F4 to change:

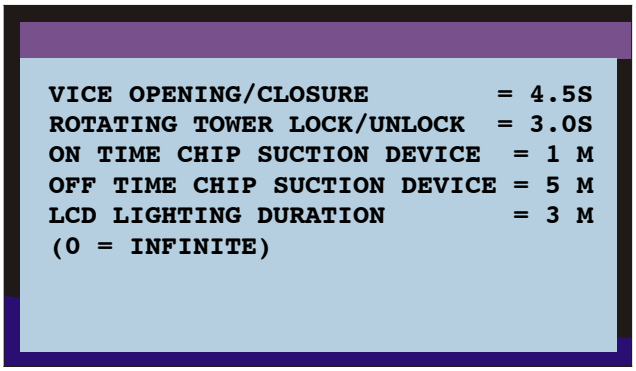


▶ to enter data, move and confirm by pressing ENTER.

▶ Press RUN/PROG to return to PREVIOUS MENU.

Set minimum blade tension threshold

▶ Press F6 to enter SET UP for cutting vice opening/closure timings, rotating tower lock and unlock, start and stop chip suction device, LCD lighting duration.

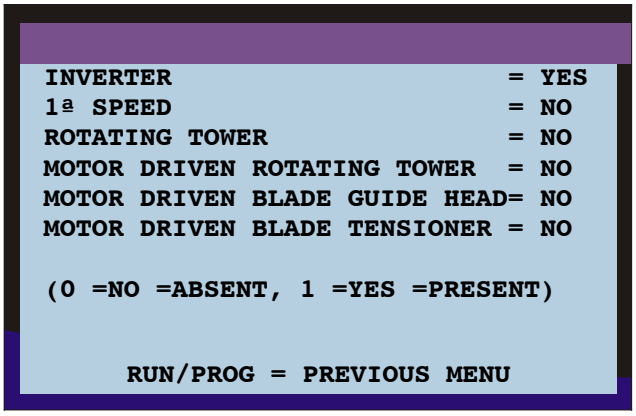

VICE OPENING/CLOSURE = 4.5S
ROTATING TOWER LOCK/UNLOCK = 3.0S
ON TIME CHIP SUCTION DEVICE = 1 M
OFF TIME CHIP SUCTION DEVICE = 5 M
LCD LIGHTING DURATION = 3 M
(0 = INFINITE)

▶ To change the pre−set values, input the timings in seconds for the first two and in the minutes for the other three.

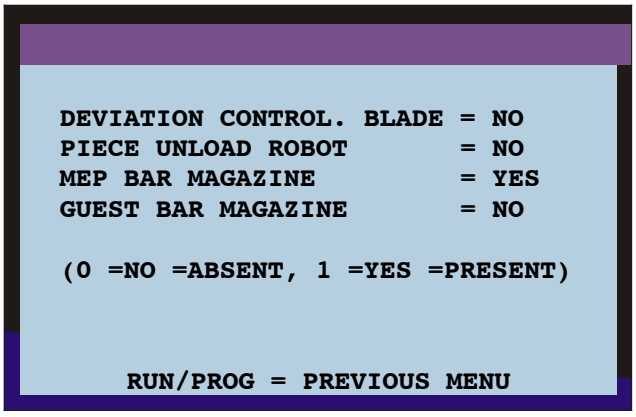
▶ Press RUN/PROG to return to PREVIOUS MENU.

Optional settings

▶ Press F7 to enter optional settings SET UP.


INVERTER = YES
1ª SPEED = NO
ROTATING TOWER = NO
MOTOR DRIVEN ROTATING TOWER = NO
MOTOR DRIVEN BLADE GUIDE HEAD= NO
MOTOR DRIVEN BLADE TENSIONER = NO
(0 =NO =ABSENT, 1 =YES =PRESENT)
RUN/PROG = PREVIOUS MENU

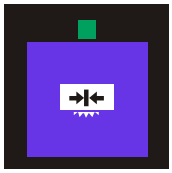
▶ Press 0 or key 1 to enable or disable each optional, press ENTER to go to the next up to the second visualised screen.


DEVIATION CONTROL. BLADE = NO
PIECE UNLOAD ROBOT = NO
MEP BAR MAGAZINE = YES
GUEST BAR MAGAZINE = NO
(0 =NO =ABSENT, 1 =YES =PRESENT)
RUN/PROG = PREVIOUS MENU

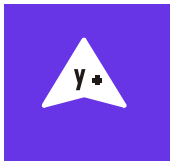
▶ Press RUN/PROG to return to PREVIOUS MENU.Press RUN/PROG to return to PREVIOUS MENU.

Cutting head setting

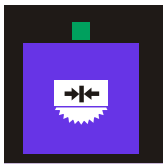
The cutting head stroke is set from the machine control console. The following figure illustrates the console keys controlling the cutting head (marked Y+ and Y−) and memorisation of the cutting start position.(Blade Upstroke Limit) and cutting end position (Blade Downstroke Limit).



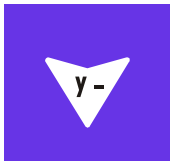
FCTI Head Upstroke Limit



Head Upstroke



FCTA Head Downstroke Limit



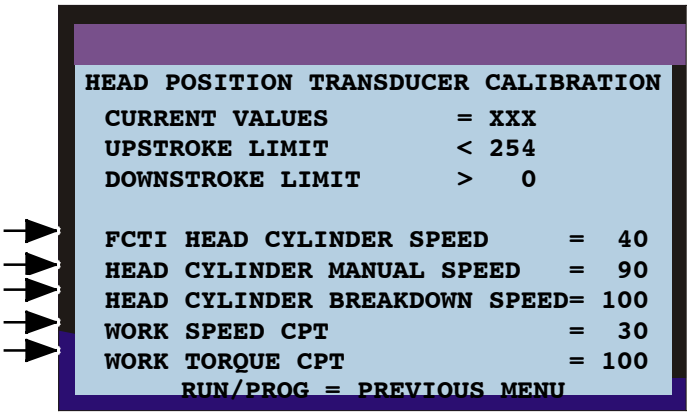
Head Downstroke

To set the cutting stroke in accordance with production requirements, refer to Chapter 5.

Head transducer calibration Set-up

The cutting head travels the distance between the start and end cut positions within a measured range between 0÷254. Press F8 on the SET−UP menu, and RESET to start head movement and to access head transducer calibration set−up. The pre−set head movement parameters are shown below and are within the same range.

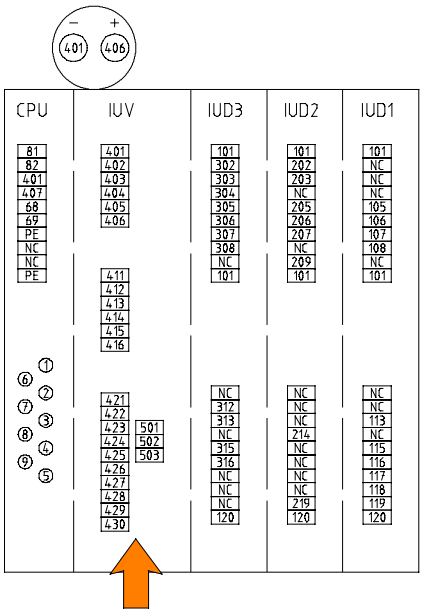
Head return to FCTI speed
Movement speed blade
Head down speed


HEAD POSITION TRANSDUCER CALIBRATION
CURRENT VALUES = XXX
UPSTROKE LIMIT < 254
DOWNSTROKE LIMIT > 0
FCTI HEAD CYLINDER SPEED = 40
HEAD CYLINDER MANUAL SPEED = 90
HEAD CYLINDER BREAKDOWN SPEED= 100
WORK SPEED CPT = 30
WORK TORQUE CPT = 100
RUN/PROG = PREVIOUS MENU

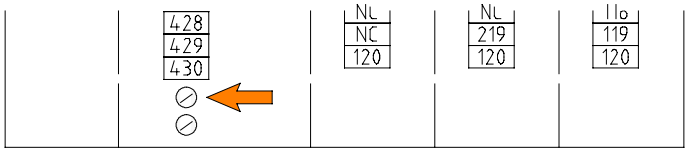
Make sure however, that the head really travels the full cutting width defined by the structural limits of the Head Upstroke and Head Downstroke Limits.
The aim of regulation is that of setting the value of the real position of the head both to FCTI (backward limit stop 254) and to FCTA (forward limit stop 000). The following operations must be performed to obtain this result.Make sure however, that the head really travels the full cutting width defined by the structural limits of the Head Upstroke and Head Downstroke Limits.

The aim of regulation is that of setting the value of the real position of the head both to FCTI (backward limit stop 254) and to FCTA (forward limit stop 000). The following operations must be performed to obtain this result.

- Now, set the head upstroke limit by returning the head to its fully up position using the up button (Y+).
- Open the electrical cabinet and locate the IUD Card shown in the figure:



- two potentiometers are mounted under the IUD card terminal board. Using a screwdriver, turn the adjustment screw on the upper potentiometer (as shown in the figure) until you obtain a reading of between 254. This reading is displayed on the machine display.

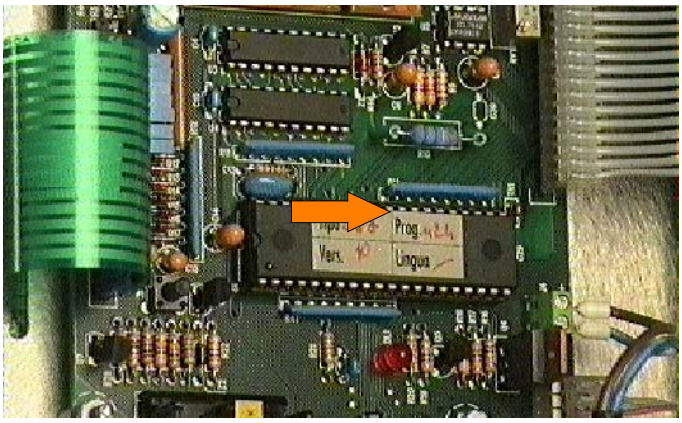


- Return the machine to normal operating conditions and test to make sure it is functioning correctly.

Replacing the microchip C8 on the control console

To do this first disconnect the machine from the power supply and open the front panel on the control console which houses the console card. Microchip C8 is located at the front of the card (as indicated by the arrow). A label is affixed to the chip indicating the type and version of the software programme.

▶ Remove the old chip from its socket and replace with a new one, taking care to fit it the right way round. Follow the necessary precautions against electrostatic discharges to avoid damaging the chip (do not, for example, wear rubber–soled shoes or woollen clothing etc.). Close the control panel and test the machine.

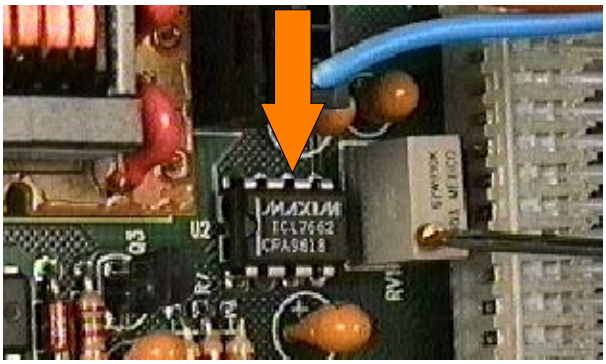


Assembly reference notch

Attention Mak sure the chip is not inadvertently fitted back–to–front, as this could cause damage to the apparatus.

Machine parameters Eeprom memory

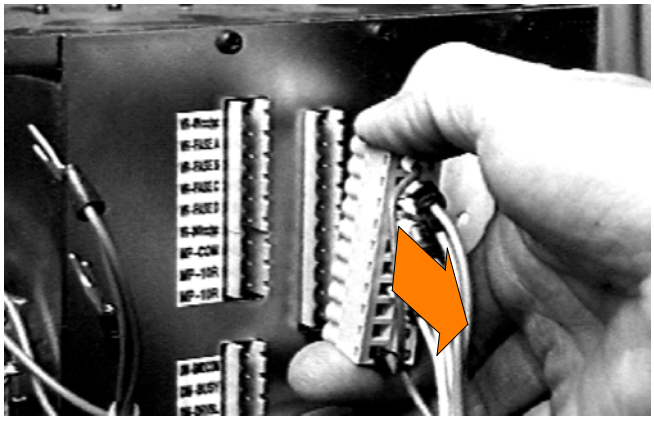
If you have to replace the control console, transfer one of the EEPROMs from the old card to the new one in order to save all the machine parameters: the EEPROM memory is illustrated in the photo below.



Replacing the MEP 24 controller Eprom

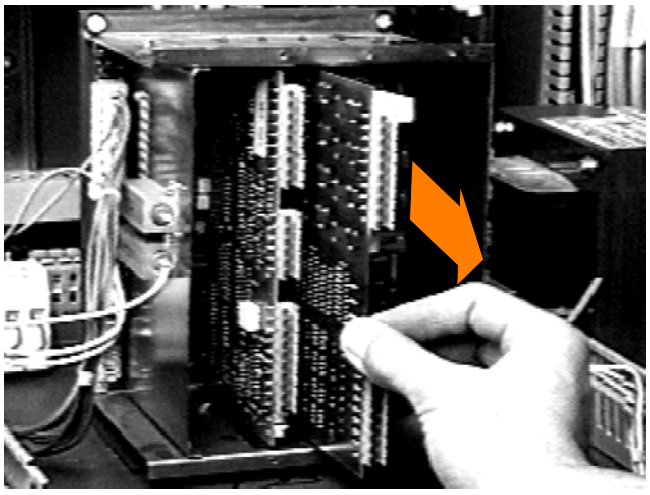
To do this, first disconnect the machine from the power supply.and open the front panel on the electrical cabinet which houses the MEP 24 controller.

▶ Locate the MEP 24 controller and unhook all the terminals relative to IUV CARD and CARDS 1–2–3.

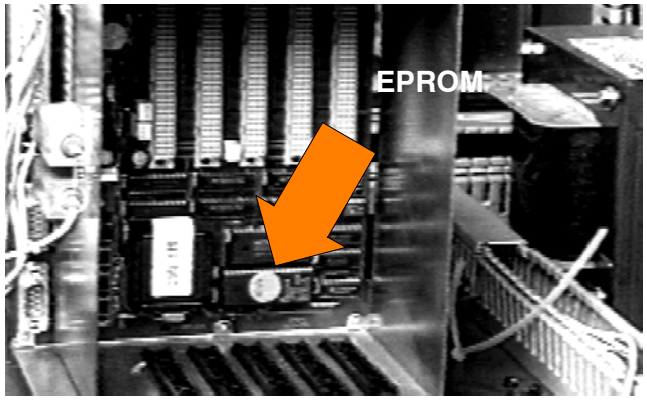


▶ Remove the front panel of the controller using a screwdriver to unscrew the screws which fix it to the controller.

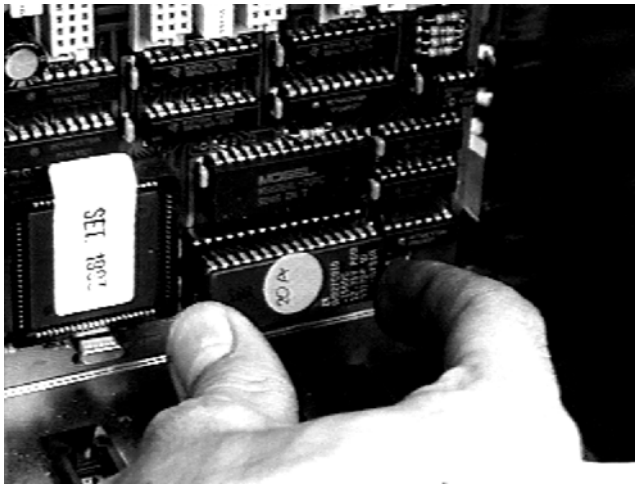
▶ Slide out the IUD and IUV cards from their slots.



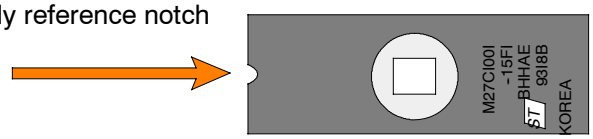
▶ The eprom is mounted on the lower section of the CPU card (as indicated by the arrow in the photo below).



- Follow the necessary precautions to protect against electro–static discharges to avoid damaging the chip (do not, for example, wear rubber–soled shoes or woollen clothing etc.).
- Remove the old eprom from its socket and replace with a new one, taking care to fit it correctly (see photo below).



Assembly reference notch

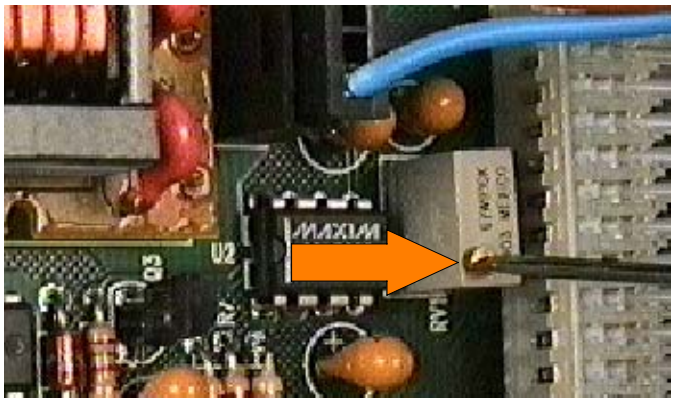


- Refit the cards in their housings, close the controller with a guard panel and reinsert the terminals. Test the machine

Adjusting the display brightness

If external factors like changing ambient lighting conditions in the machine installation site, affect visibility, adjust the brightness of the control and programming console display. This is very important since the operator must be able to clearly read the display messages at all times.

- To adjust the brightness, first remove the screws fixing the front console panel. The photo below illustrates the MEP 24 controller card on which the brightness potentiometer is marked by an arrow.



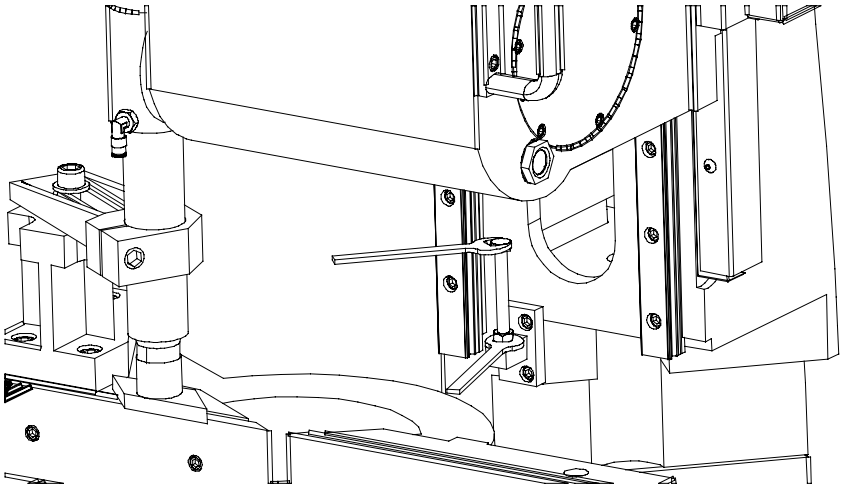
- Using a screwdriver, rotate the potentiometer until the required display brightness is obtained.

Mechanical systems

Cutting head stroke

The head cutting stroke is defined by the cut start position (Head Upstroke Limit) and cut end position (Head Downstroke Limit) which are electronically programmed by the control console. The cutting head is also equipped with a mechanical stop which defines the bottom limit of its stroke:

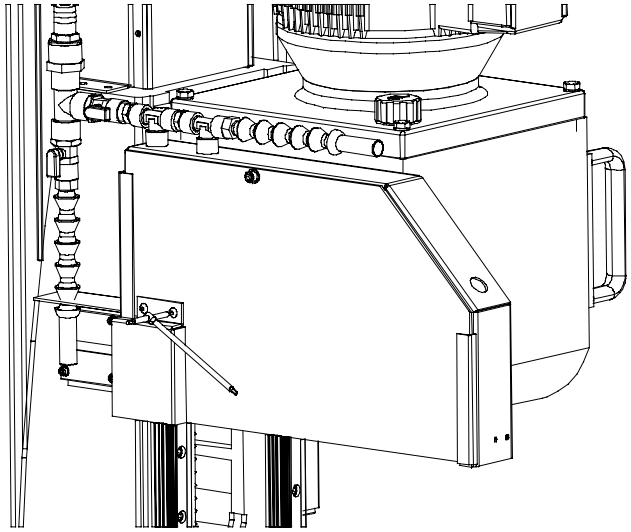
▶ to adjust this stop, use two hex wrenches, one to lock the nut and the other to tighten or slacken the stop screw.



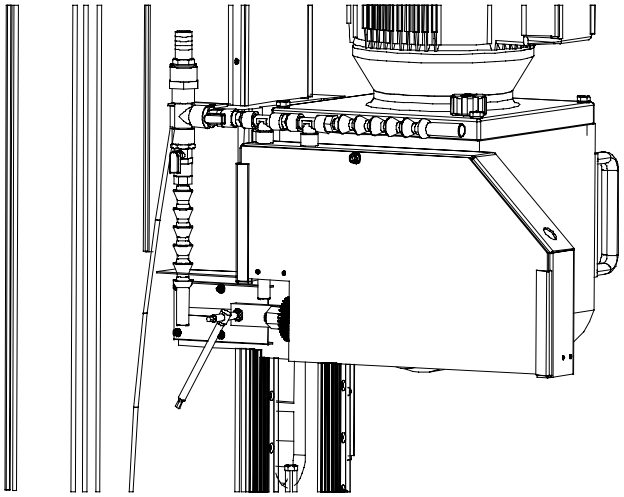
Adjusting the position of the blade-cleaning brush

When the cutter disk is not clean enough, check the blade−cleaning brush for wear and if it's working correctly. The figure below illustrates how the brush should be adjusted if need be.

▶ Loosen the screw highlighted in the drawing, and remove the protection;



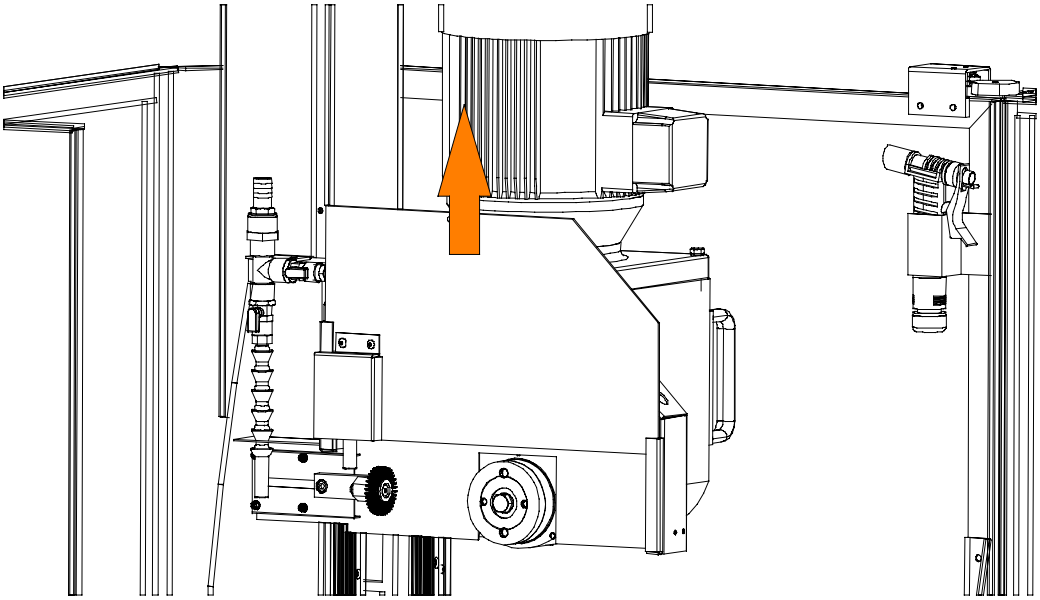
▶ adjust the position of the blade in relation to the teeth, as shown;



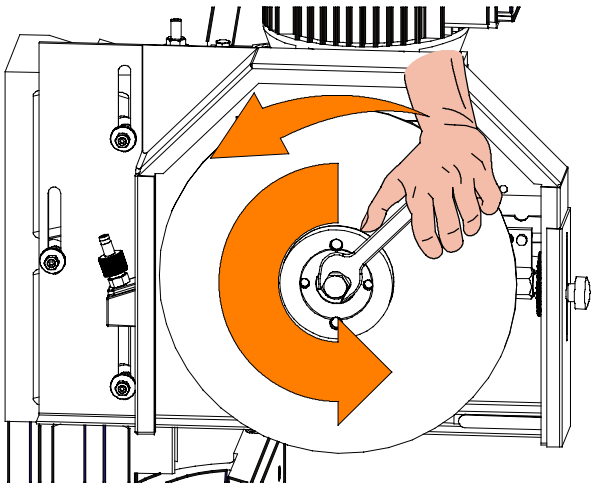
Replacing tool

As we have already said, this machine uses different kinds of blades according to the material to be cut. The procedures described below, however, also apply in the event of wear or breakage of the blade. To replace the blade, proceed as follows:

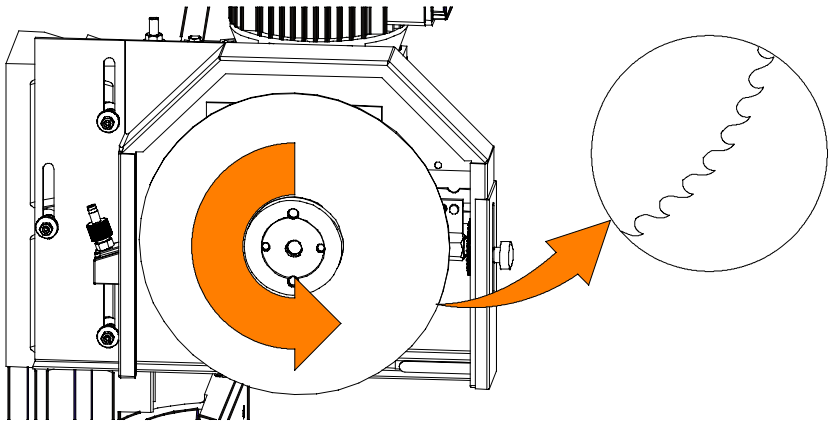
- switch off the machine and position the head so that the disc is easily accessible;
- the machine is equipped with a vertical pneumatic vice that can be moved away from the guard by unfastening the screw fixing it to the support;
- remove the screw with knob to free the plexiglass guard cover and lift it off in a vertical direction;



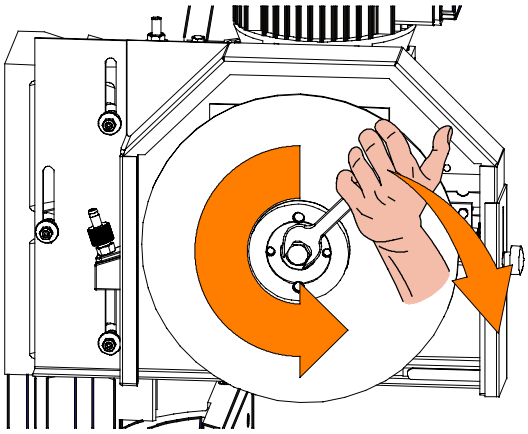
- use a 19 mm spanner to slacken the hexagonal screw that locks the disc, turning the spanner in the direction of rotation of the disc; remove the old disc and insert the new one, making sure that the centering pins fit correctly into the holes in the disc.



Attention Make sure that the teeth on the cutter blade are facing in the direction of rotation. When changing the tool, turn the cutter blade until drive is engaged to eliminate any backlash in the drive pins.



▶ Tighten the lock nut and refit all guards and any other components you may have removed to facilitate installation.



N.B. Adjust the position of the blade-cleaning brush, or replace it when worn.

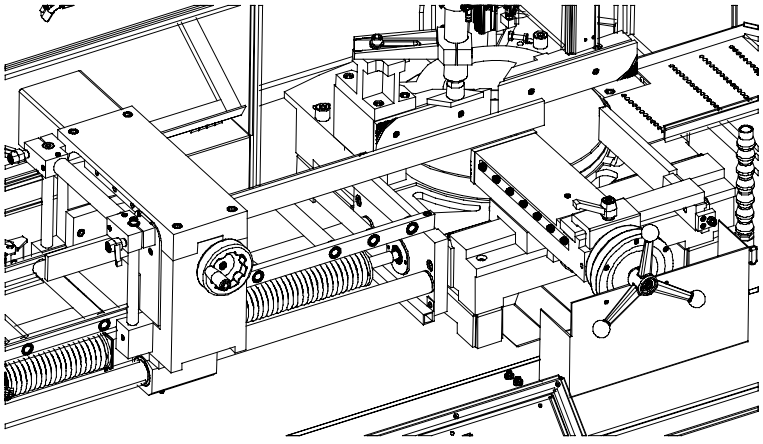
Attention If disks are fitted with diameters less than 370 mm, adjust the head mechanical stop screw as described above.

Feeder

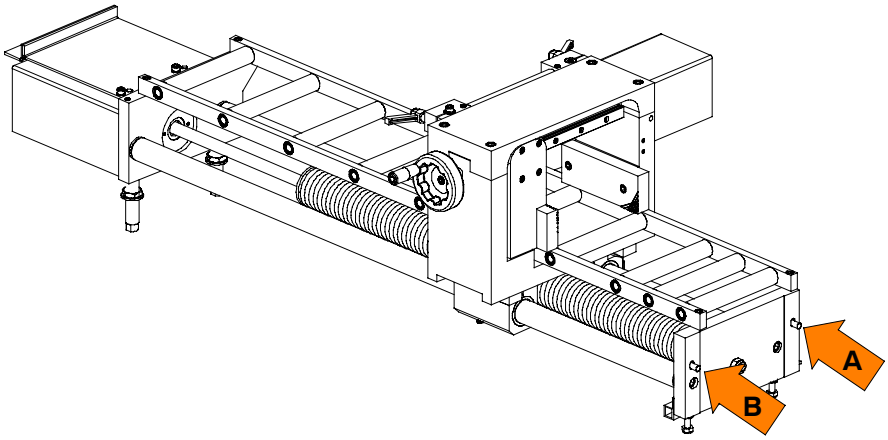
Should the feeder at a later stage in time become misaligned with the cutting table, then use the levelling devices located on the side of the machine and the loading table to restore. Misalignment can be measured using a workshop standard ruler or a straight bar section.

▶ Lower the rear guard rail.

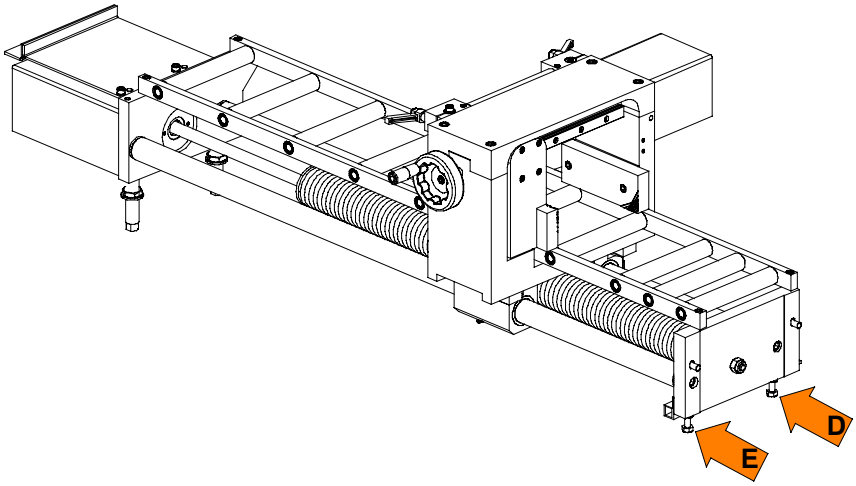
▶ Place the ruler on top of the feeder to check that the feeder is parallel to the cutting table.



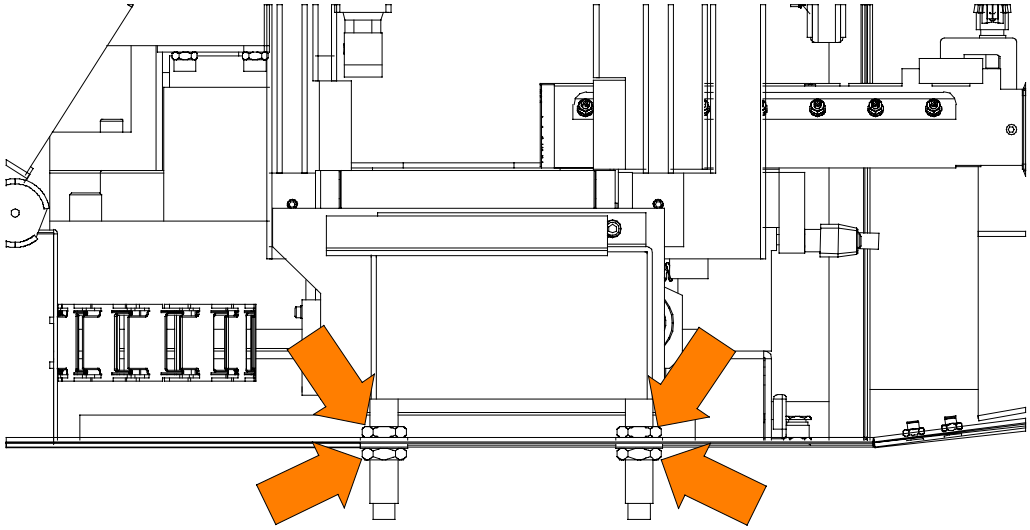
▶ If the feed table is not parallel to the cutting table, move the feed carriage away from the platform, then loosen the fixing TCEI screws on the feeder (A–B).



▶ Adjust the foot height (D–E), according to the measurement read on the ruler on the cutting table so as to obtain a difference in level of 0.5 mm between the two tables.



▶ Once the height has been set with a standard ruler near the fixed platform, line up the rest of the feeder using the support pins to adjust as shown in the figure;



▶ open the left door panel on the base to access the adjustment nuts and the 4 support pins;

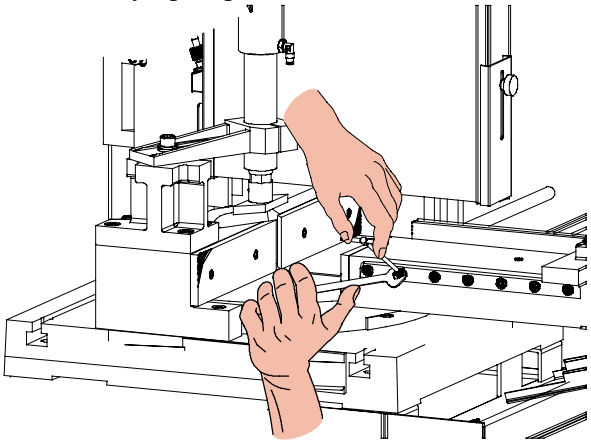
Vice

The shearing vice, which is a standard fitting on the **TIGER 370 CNC–MR**, is equipped with an anti–chip device, adjustable cross positioning, and is driven by a pneumatic cylinder known as the volampress. These elements will be dealt with one by one in the following.

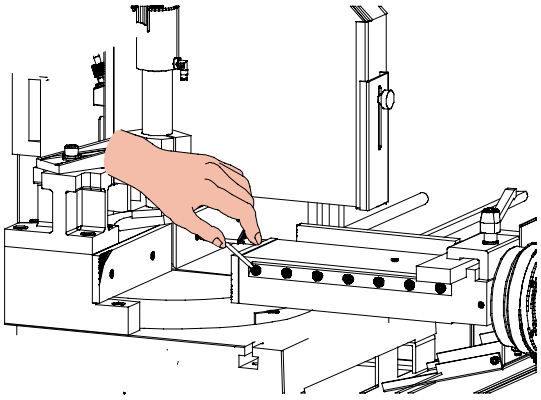
Adjusting the vice play

Any play which develops between the slideway and the slide gibs on the vice must be compensated by adjusting the grub screws setting the distance between the gib and lead screw, proceeding as follows:

- slacken all the locknuts on the grub screws in the slide, holding the screws still using an Allen key.
- move the vice to its fully open position.



- adjust the slight pressure exerted by the grub screws on the gib, starting with the first two in contact with the lead screw.
- adjust these two grub screws and tighten the relative lock nuts, keeping the screws still with an Allen key.

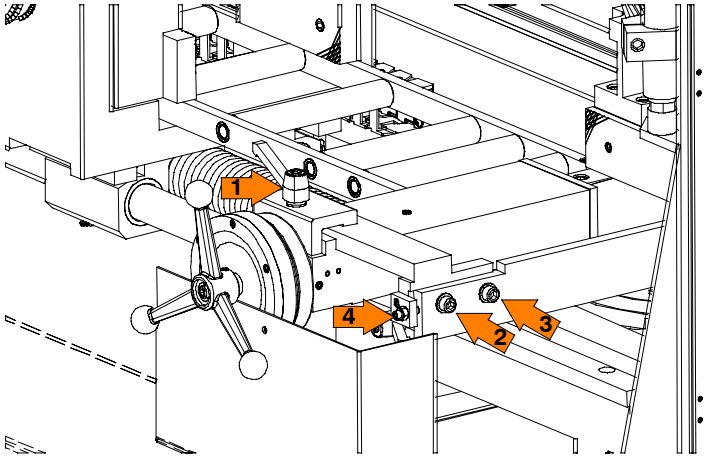


- close the vice until the other two grub screws coincide with the lead screw.
- repeat this adjustment on the gib grub screws for the entire length of the slideway
- at the end of the operation, use the handwheel to move the slide backwards and forwards, identifying the zones where the grub screws exert greater pressure on the gib.
- repeat the adjustments if necessary.
- tighten or loosen the upper nuts on the supports according to the reading obtained with the standard ruler on the machine work table.

Adjusting the anti-chip device

The vice is fitted as standard with a rag prevention device that serves to support the material and prevent the formation of ragged edges at the end of the cut. To adjust the rag prevention device transversely:

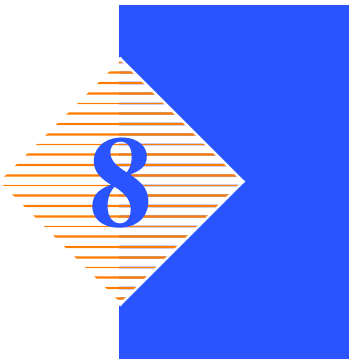
- loosen the release lever (1) located above the vice slide;
- movement the rag prevention device arm to the right or left;
- tighten the release lever.



To adjust the longitudinal position of the vice jaw, proceed as follows:

- tighten the cutting vice completely;
- slacken the two screws located to the side of the rag prevention device (2–3);
- slacken the nut that locks the grub screw;
- adjust the longitudinal position of the rag prevention vice jaw by slackening or tightening the grub screw (4) until the position of the rag prevention jaw is aligned with that of the cutting jaw;
- hold the bolt still using the hexagonal key and tighten the blocking nut.

Maintenance and choice of consumables



TIGER 370 CNC–MR is built to be sturdy and long–lasting It has no need of any special maintenance, though, like all other tools, it needs adjusting from time to time, especially if not regularly looked over or used without due care.

This chapter, therefore, is intended as a guide for those who want to look after the machine and get the most out of it for as long as possible.

The role of the operator

The person operating and maintaining the machine must follow these instructions for his own safety, as well as for the safety of other personnel, and in the interests of machine productivity:

- check that his own work and that of the other operators of the machine always complies with the relevant safety standards. Therefore, check that the safety devices are in position and work perfectly and that personal safety requirements are complied with.
- ensure that the working cycle is efficient and guarantees maximum productivity, checking:
  - the functions of the main components of the machine;
  - the sharpness of the blade and coolant flow;
  - the optimum working parameters for the type of material.
- check that the quality of the cut is that required and that the final product does not have any machining defects.

Maintenance requirements

- All ordinary and extraordinary maintenance must be carried out with the power switched off and the machine in emergency condition.
- To guarantee perfect operation, all spare parts must be MEP S.p.A originals.
- On completion of maintenance works, ensure that the replaced parts or any tools used have been removed from the machine before starting it up.
- Any behaviour not in accordance with the instructions for using the machine may create risks for the operator.
- Therefore, read and follow all the instructions for use and maintenance of the machine and those on the product itself.

General maintenance

Daily

The daily maintenance operations to carry out on the machine are as follows:

- remove all swarf from the machine (using compressed air or preferably thread–free cloth;
- top up the lubricant/coolant fluid level;
- check the wear of the blade and change if necessary;

Weekly

The weekly maintenance operations are as follows:

- remove all swarf from the machine;
- empty the chip drawer on the side of the pedestal;
- clean the vice and lubricate all the joints and sliding surfaces using a good quality oil;
- check the oil level in the drive box: if necessary top up through the filler cap;
- Check the cutting clamp slide, if it is not precise or there is sideways movement, regulate as indicated in chapter 7.

Monthly

This section lists the operations to be carried out for the monthly maintenance of the machine.

- clean thoroughly the water tank and the electric pump filter;

Maintenance of working parts

During maintenance work on the **TIGER 370 CNC–MR**, special attention should be paid to operating units such as the transmission box.

Transmission box

After 100 work hours, empty the drive box using the following procedure:

- remove the outlet plug, collect oil in a container for used oils; to speed up the operation remove the inlet plug positioned on the top of the head;
- once the operation is complete, replace the outlet plug and fill with AGIP BLASIA 460 oil, or equivalent, up to the point indicated by the level plug positioned on the right–hand side of the head;
- after every 2000 working hours repeat the oil change operation.

Consumable materials

It is essential to use specific oils for the pneumatic and lubricant/coolant circuits. The oils suitable for each of these circuits are listed below.

Oils for transmission box

The machine is supplied with AGIP BLASIA 460 oil, ISO and UNI symbol CC460. However the following oils can be regarded as compatible or with equivalent characteristics:

SHELL OMALA 460

Transmission box:
– capacity Kg. 10

Oils for lubrication/coolant liquid

The oil used for the lubrication/coolant fluid in the machine is CASTROL Syntolin TFX. Though there are no specific standards for these types of oils, MEP considers that CASTROL Syntolin
TFX is the best product available with regard to quality:price ratio. Nevertheless, the following oils of similar characteristics can be said to be compatible:

AGIP NB 200 – SHELL Lutem TT – IP Utens Fluid–F

Finally, one particular blade manufacturer (LENOX) recommends and supplies a coolant under the name of LENOX BAND–ADE SAWING FLUID.

Coolant tank:
– tank capacity 50 litres
– oil concentration 5–6%

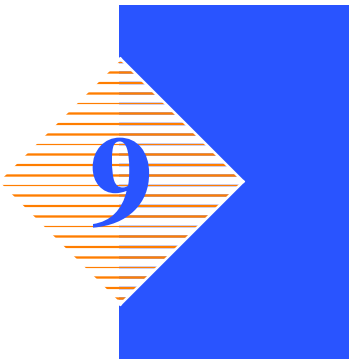
Oils for spray mist system (optional)

The used oil type for the optional spray mist system is BLASER Vascomill 22. The following oils can also be said to have similar characteristics and are therefore compatible:

UNIST Coolube 2210 – FUCHS Plantocut Micro Plus 27

– tank capacity Lt. 1

Cutting speed and choice of tools



The cutting speed depends on the disk rotation speed and supply speed. This chapter illustrates the speed tolerance of the basic version of the machine.

Cutting speed

Basic version

The inverter is an electronic instrument fitted to the **TIGER 370 CNC–MR** for varying spindle motor rpm. This device facilitates the operator's task to execute special cuts, by adapting the rotation speed of the tool to the specific material. Blade use can thus be optimised, inasmuch as a blade not especially suitable for cutting a certain material can be adjusted all the same to the task, and premature wear is avoided.
The basic version, with 4–pole motor and inverter, has this range of cutting speeds:

- 15÷150 rpm.

The speeds can be set on the control panel via a potentiometer.The speeds can be set on the control panel via a potentiometer.

Inverter technical specifications	
Protection rating	IP 31
Vibration and shock resistance (EN50178)	0.6 gn from 10 to 50 Hz 2 gn from 50 to 150 Hz
Max. relative humidity	93% without condensation or drop-forming
Acceptable Temperature Range (EN 50178)	For warehouse storing: from -25° C to +65° C For operating purposes: from -10° C to +40° C
Max. altitude	1000mt. with no derating
Supply	- single phase: 200V - 15% to 240V + 10%
	- three phase: 200V - 15% to 230V + 10% 380V - 15% to 460V + 10%
Frequency	50/60 Hz ± 5%
Output voltage	Maximum voltage equal to the supply voltage
Output frequency range	0,5 a 320 Hz
Max. transients	150% of electronic speed control rated current for 60 secs.
Frequency resolution	- Display: 0.1 Hz - Analog inputs: 0.1 Hz per 100 Hz max.
Switching frequency	Adjustable from 2.2 to 12 Hz max.

Inverter technical specifications	
Electronic speed control protection and safety devices	Galvanic insulation between power and control panel
	Short circuit protection: - of available internal supplies; -between U-V-W output phases between phase and earth for calibres from 5.5 to 15Kw
Motor protections	Thermal protection against overheating and overcurrents
Motor protections	Protection integrated in the electronic speed control with 1^2t calculation
	Protection integrated in the electronic speed control with 1^2t calculation
Motor protections	Protection integrated in the electronic speed control with 1^2t calculation

Choice of blade

The different types of blade that can be used for the **TIGER 370 CNC–MR** must in any case respect the following general characteristics:

- "Fine tooth pitch": for thin wall materials such as sheet steel, tubes and profiles;
- "Coarse tooth pitch": for large cross-sections; for soft materials (aluminium alloys and soft alloys in general).

Tooth pitch

The choice of the most suitable tooth pitch depends on various factors:

- the size of the section;
- the hardness of the material;
- wall thickness.

Solid sections call for discs with a coarse tooth pitch, while small cross–sections require blades with finer teeth. This is because when cutting walls of small cross–section (1÷7 mm) profiles, it is important that the number of teeth actually making the cut should not be too small, otherwise the effect obtained will be one of tearing rather than of swarf removal, leading to a large increase in shearing stress. On the other hand, when cutting thick materials or solid sections using an excessively fine tooth pitch, the swarf collects as a spiral inside the gullet, and since fine tooth pitches have small gullets, the accumulated swarf will exceed the gullet capacity and press against the walls of the workpieces, resulting in poor cutting (same situation with soft materials), greater shearing stress and hence breakage of the blade.

Choice of tooth pitch T as a function of cross–section to be cut for light alloy solid pieces and profiles			
S in mm	Pitch T	S and sp in mm	Pitch T
10	4	10 sp = 0,5	3
30	6	30 sp = 1,5	4 – 5
50	8	50 sp = 2,5	5 – 6
70	10	70 sp = 3,5	6–7
90	12	90 sp = 4,5	7 – 8
130	16	130 sp = 6,5	8

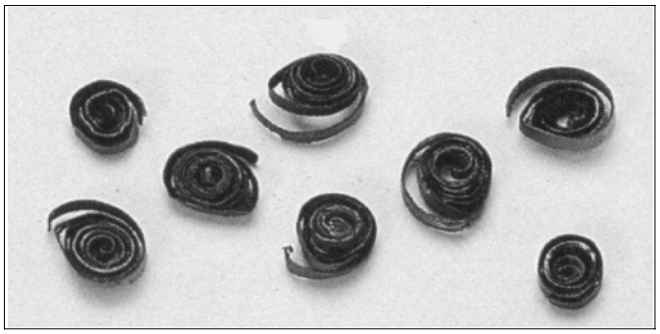
KEY:
S = diameter or width of the solid piece to be cut in mm;
sp = thickness of the wall to be cut in mm;

T = tooth pitch in mm.
A larger pitch should be chosen when, as a result of the shape of the piece to be cut, the cross−section at any given point exceeds the average cross−section given above.

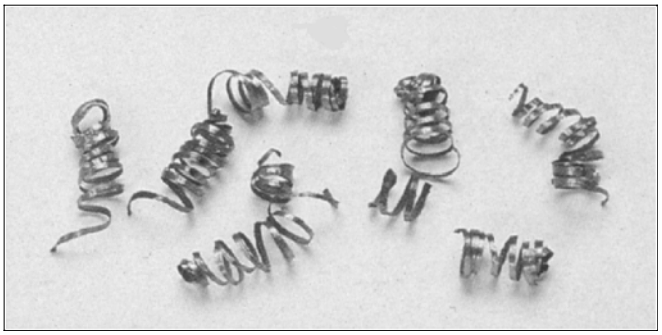
Types of swarf:

- Very fine or fragmented swarf indicates that the downstroke speed and/or cutting pressure is too low.

- Thick and/or blue swarf indicates that the blade is overloaded.



- Long coils of swarf indicate ideal cutting conditions.



Cutting and feeding speed

The cutting speed, in m/min, and the head feeding speed, in cm^2/min, are limited by the amount of heat generated near to the points of the teeth. If the head feeding speed is too high, the cut will not be straight in either the vertical or the horizontal plane. As we have already said, the cutting speed depends on the strength (kg/mm^2) and hardness (HRC) of the material and the dimensions of the thickest section. The feeding speed depends on the cross−section of the material. Solid or thick−walled materials (thickness > 5 mm), can therefore be cut at high speed providing there is sufficient swarf removal by the blade, while thin−walled materials such as tubes or thin profiles must be cut with a low feeding speed. A new blade requires a wearing−in period, during which time a feeding speed of about half normal speed should be used.

Lubricant/coolant

The lubricating/cooling fluid must ensure that the blade teeth and material in the area of the cut do not overheat. Furthermore, the quantity and pressure must be sufficient to remove the swarf from the cutting zone. The fluid must be an excellent lubricant, such that prevents abrasion of the teeth and welding of the swarf to the teeth themselves (seizing).

Blade structure

The circular blades most frequently used for cutting–off machines are HSS–DMo5/M2 consisting of a single piece and characterised by a high level of toughness and a good cutting resistance. With non–ferrous materials it is normal to use circular blades with brazed hard metal (HM) cutting edges, which offer excellent resistance to wear but low resistance to impact, which in any case is not generally a problem with non–ferrous materials.
They consist in a disk made of alloy steel (71 Cr 1) with teeth and places for the plates, made of Widia K10.

Key									
Mo	Molyb-denum	Ni	Nickel	Si	Silicon	V	Vanadium	W	Tungsten
Al	Aluminium	C	Carbon	Co	Cobalt	Cr	Chromium	Mn	Manganese

TYPE OF BLADE	*C*	*Cr*	*W*	*Mo*	*V*	*Co*	*HRC*
HSS-DMO 5/M2	0,47	1,00	6,37	1,00	0,12		45-50
HM ø 300x32x3,4	0,71 ÷ 0,78	0,20 ÷ 0,30					43 +/- 1

N.B. The numbers in the columns indicate the % content of the element in the steel.

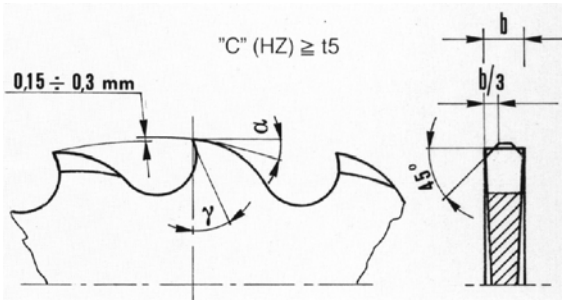
Types of blades

The blades fitted to the **TIGER 370 CNC–MR** have dimensions 370x32x3 mm and are of HSS DMo5 hard steel type since the machine is to be used for cutting non–ferrous materials. In addition to the size and pitch of the teeth, however, the blades also have different geometric characteristics in accordance with their particular use:

- tooth sharpening, which in this case may be BW with alternate raked tooth or C with roughing tooth raked on both sides and non-raked finishing tooth;
- tooth pitch, the distance between the crests of two subsequent teeth (tooth pitch = T).

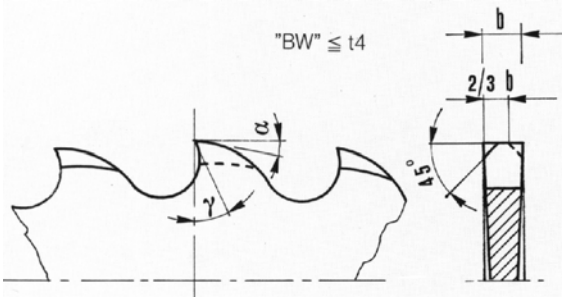
Tooth shape

“C” TYPE SHARPENING (HZ)
Coarse toothing with roughing tooth raked on both sides and non–raked finishing tooth. The roughing tooth is about 0.3 mm higher.



Coarse toothing with roughing tooth and finishing tooth. Used in saws with pitch greater than or equal to 5 mm for cutting ferrous and non–ferrous materials with solid or solid–profiled sections.

“BW” TYPE SHARPENING DIN 1838–UNI 4014
Coarse toothing with teeth alternately raked to the right and left.



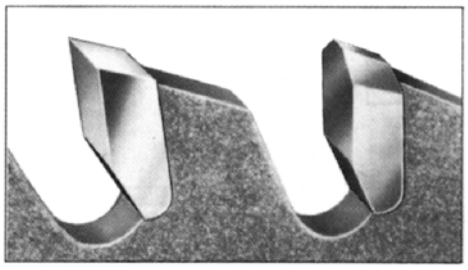
Toothing generally used on cutting–off machines for cutting ferrous and alloy materials with tubular and profiled sections.

The disks for the **TIGER 370 CNC–MR** are ∅ 370x32x3 with C–type sharpness; however, also the tooth pitch is important, as indicated in the table below.

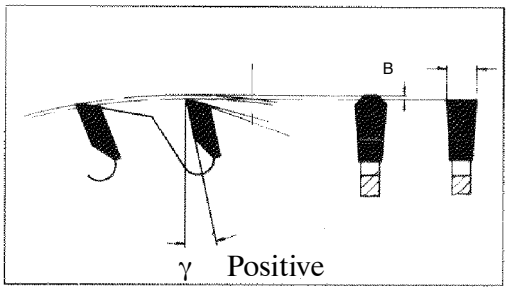
D.	T	Z	D.	T	Z	D.	T	Z
300	5	180	275	5	180	250	8	120

POSITIVE AND NEGATIVE CUTTING ANGLES

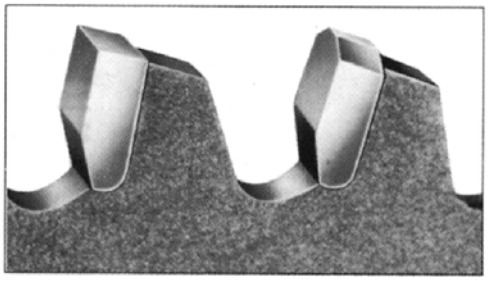
The cutting angle γ may vary from positive to negative depending on the cutting speed, the profile and the type of material to be cut.



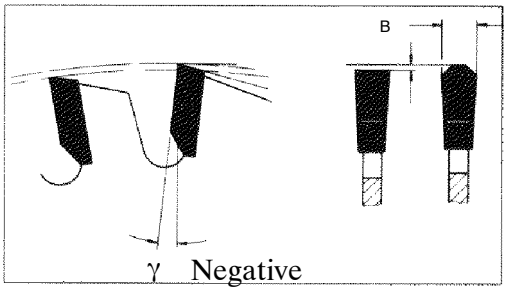
A positive angle γ determines better penetration of the tool and hence lower shear stress and greater ease of sliding for the swarf over the cutting edge. On the other hand, the cutting edge has lower mechanical resistance, so as the breaking load of the material to be cut increases, the cutting angle decreases from positive until it becomes negative so as to offer a cutting edge with a larger resistant section.



Short swarf material such as brass, bronze, aluminium and hard cast iron require smaller cutting angles because the swarf becomes crushed immediately and the rake angle has little effect during the cutting stage.



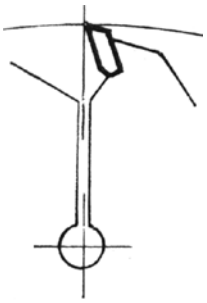
The **TIGER 370 CNC–MR** uses discs with positive cutting angles for cutting solid materials and with negative cutting angles for cutting hollow profiles. This is because, as a result of the high cutting speeds (2900 rpm), even with non–ferrous materials the tool ”strikes” against the wall of the profile to be cut several times, thus requiring a cutting edge with a larger resistant section.



Circular saws can also be characterised by other parameters such as the whine reduction feature, which cuts down noise at high speeds, or expansion, which compensates for the pushing of swarf inside the cutting edge, thus reducing the thrust on the walls of the material to be cut.

Whine reduction feature

Expansion cut



This table can be used to facilitate the choice of toothing since it takes into account both the size of the material to be cut and the diameter of the disc to be used.

	D 200			225		250		275		300		315		350		370		400		425		450		500	
Solid section	S	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z	t z
	10	5 130	6 100	5 140	6 120	5 160	6 128	5 180	6 140																
	30	6 100	8 80	6 120	8 80	6 128	8 100	6 140	8 110	6 160	8 120	7 140	8 120												
	50			8 90	10 70	8 100	10 80	8 110	10 90	8 120	10 90	8 120	10 100	9 120	10 110	10 110	11 100								
	70							10 90	12 70	10 90	12 80	10 100	12 80	11 100	12 90	11 100	12 90	10 120	12 100	10 130	12 110	10 140	12 120	10 150	12 130
	90									12 80	14 70	12 80	14 70	12 90	14 80	12 90	14 80	12 100	14 90	12 110	14 94	12 120	14 100	12 130	14 110
	110											12 80	14 70	12 80	14 70	12 90	14 80	12 100	14 90	12 110	14 94	12 120	14 100	12 130	14 110
	130													12 80	16 70	14 80	16 70	14 90	16 80	14 94	16 84	14 100	16 90	14 110	16 100
	150																	14 90	16 80	14 94	16 84	14 100	16 90	14 110	16 100
Hollow section	D																								
	10	3 200	3 200	3 220	3 220	3 250	3 250	3 280	3 280																
	30	4 160	5 130	4 180	5 140	4 200	5 160	4 220	5 180	4 220	5 180	4 240	5 200												
	50			5 140	6 120	5 160	6 128	5 180	6 140	5 180	6 160	5 200	6 160	5 200	6 180	5 220	7 160								
	70							6 140	8 110	6 160	8 120	6 160	7 140	6 180	7 160	7 160	8 140	6 200	7 180	6 220	7 190	6 230	7 200	6 260	7 220
	90									8 120	10 100	7 140	8 120	7 160	8 140	7 160	8 140	7 180	8 160	7 190	8 160	7 200	8 180	7 220	8 200
	110											8 120	10 100	8 140	9 120	8 140	9 120	8 160	9 140	8 160	9 150	8 180	9 160	8 200	9 170
	130													9 120	10 110	9 120	10 110	9 140	10 120	9 150	10 130	9 160	10 140	9 170	10 150
	150															9 120	10 110	9 140	10 120	9 150	10 130	9 160	10 140	9 170	10 150

Blade selection table with respect to cutting speed and downstroke speed

RECOMMENDED CUTTING PARAMETERS	CUTTING ANGLE α	CUTTING ANGLE γ	Cutting section (in mm)	10–20			20–40			40–60			60–90			90–110			110–130			130–150			Recommended lubrificants
				T mm	Vt rpm	Av rpm	T mm	Vt rpm	Av rpm	T mm	Vt rpm	Av rpm	T mm	Vt rpm	Av rpm	T mm	Vt rpm	Av rpm	T mm	Vt rpm	Av rpm	T mm	Vt rpm	Av rpm	
Mild steel R = 350–500 N/mmq	20	8		5	50	160	7	45	150	10	45	140	12	40	130	14	40	110	16	35	100	18	30	90	Emulsion – cutting oil
Medium steel R = 500–700 N/mmq	18	8		4	30	130	6	30	120	9	25	110	12	25	110	14	20	100	16	20	90	16	15	80	
Hard steel R = 750–950N/mmq	15	8		4	20	110	6	20	110	8	18	100	11	17	50	14	15	80	16	14	70	16	12	60	
Super hard steel R = 950–1000 N/mmq	12	6		3	15	60	4	15	60	6	14	50	9	14	50	12	13	45	14	13	45	14	12	40	
Hardened and tempered steel R = 950–1300 N/mmq	10	6		2	9	35	3	9	33	4	9	30	6	8	28	8	7	25	10	7	25	12	7	22	
Austenitic stainless steel R = 500–800 N/mmq	12	8		4	20	50	6	19	45	8	18	45	11	17	40	15	15	35	16	14	35	16	12	35	
Martensiticstainless R = 500–800 N/mmq	15	6		4	20	50	6	19	45	8	18	45	11	17	40	15	15	40	16	14	35	16	12	35	
Grey iron	12	8		4	25	100	6	23	100	8	22	90	11	20	80	14	19	60	16	17	70	16	16	60	
Aluminium and alloys R = 200–400 N/mmq	22	10		6	1100	1800	8	1000	1700	12	900	1600	16	800	1400	18	700	1300	20	600	1100	20	500	900	
Aluminium and alloys R = 300–500 N/mmq	20	8		5	200	400	7	180	400	10	160	350	12	160	300	14	140	300	16	130	250	16	130	250	
Copper R = 200–350 N/mmq	20	10		6	400	600	8	350	600	11	300	550	14	250	550	17	200	500	18	150	500	20	120	400	Emulsion
Hard bronze R = 600–900 N/mmq	15	8		5	400	800	7	400	700	10	350	700	12	300	600	14	250	500	16	200	500	18	150	400	
Phosphor bronze R = 400–600 N/mmq	12	8		4	120	160	8	110	150	8	100	140	10	90	130	12	70	250	14	60	100	16	50	90	
Brass R = 200–400 N/mmq	16	16		5	600	1100	6	600	1100	10	550	1000	12	550	900	16	500	900	18	500	800	18	450	800	
Alloyed brass R = 400–700 N/mmq	12	16		5	500	700	7	400	600	10	350	600	12	350	500	16	300	500	18	300	400	18	200	400	Cutting oil
Titanium and alloys R = 300–800 N/mmq	18	8		4	50	160	4	45	150	6	45	140	10	45	130	12	40	110	14	35	100	16	30	90	
Profiles and tubes with wall thickness 0.05 D R = 300–600 N/mmq	18	8		3	19	130	4	18	120	5	18	110	8	17	100	10	16	90	12	16	90	14	15	80	
Profiles and tubes with wall thickness 0.25 D R = 300–600 N/mmq	15	8		2	35	130	3	33	120	4	30	110	6	30	100	8	26	90	10	24	90	12	24	80	

Classification of steels

The tables on this page provide users with information on materials to cut, enabling their classification with respect to hardness and consequently the correct blade to use.

Types of steel				Hardness		
UNI	DIN	BS	AISI	Brinell HB	HRB	Kg/mmq
C 22 - C 35	CK 22 - CK 3	En 2 C - En 6	1022 - 1035	160 - 170	34 - 87	55 - 59
C 45	CK 45	En 8	1040	160 - 180	84 - 89	55 - 61
C 10 - C 15	CK 10 - CK 15	En 32 A - En 328	1010 - 1015	150 - 175	81 - 87	51 - 59
C 60	CK 60	En 9	1060	160 - 180	84 - 89	55 - 61
		4360 - 50 A		160 - 180	84 - 89	55 - 61
	17100	3706 - 1.2.3.	ASTMA - 36/68	160 - 180	84 - 89	55 - 61
45 Cr Si 9	17115	4360		160 - 180	84 - 89	55 - 61
		En 20 A		190 - 215	91 - 97	64 - 73
34 Cr Mo 5	17221	970 - 1955	1065	180 - 205	89 - 94	61 - 69
		En 18 B	5135 - 5145	180 - 200	89 - 93	61 - 67
35 Cr Mo 4	34 Cr Mo	En 19 B	4135	200 - 230	93 - 99	67 - 77
	36 Ni Cr 6	En 111	3135	190 - 230	91 - 99	64 - 77
		En 36	3310 - 3315	200 - 230	93 - 99	67 - 77
20 Nc Cr Mo 2		En 362	4315	200 - 225	93 - 98	67 - 75
		En 100 D	8645	190 - 220	91 - 97	64 - 74
	1880 X C 95	DX	W 1	150 - 190	80 - 91	51 - 64
100 Cr 6	100 Cr 6	En 31	52100	210 - 230	96 - 99	71 - 77
		B 2	L 6	190 - 230	91 - 99	64 - 77
52 Nc Cr Mo KU	56 Ni Cr Mo V 7			217 - 248	97 - 102	73 - 83
	2750 (280W18)	18 % W	T 1	217 - 248	97 - 102	73 - 83
		1507 - 825	1310	160 - 220	84 - 91	55 - 64
		A 2	M 13	200 - 230	93 - 99	67 - 77
	210 Cr 46	A 1	D 3	215 - 240	97 - 101	73 - 81
	4845	En 58 G	309 S	150 - 200	80 - 93	51 - 67
X 12 Cr 13	4001	En 56 A	410	150 - 200	80 - 93	51 - 67
X 6 Cr Ni 1810	4301	En 58 E	304	130 - 170	74 - 86	45 - 58
X Cr Ni 1910						
X 8 Cr Ni Mo 1713	4401	1501 - 845	316	160 - 200	84 - 93	55 - 67
Phosphor bronze				60 - 100	56,5	36
Aluminium bronze				70 - 90	49	32
Manganese bronze				95 - 120	51 - 69	34 - 42
Silicon bronze				70 - 100	56,5	36

Classification of steels

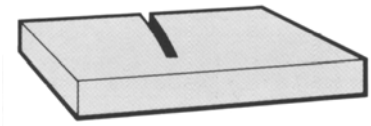
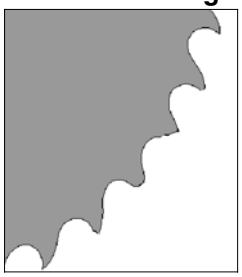
Material	SS Sweden	AISI U.S.A.	DIN Germany	BS Great Britain	UNI Italy	AFNOR France
Carbon steels	1311	1015 - 1035	C 22 - C 35	050 A 20	C 15 - C 35	XC 18
			20 Mn 5 - 28 Mn 6	080 M 46 - 50	C 22 Mn	XC 38 H 1
	1572		CK 22 - CK 50	120 M 19	C 28 Mn	20 M 5
				150 M 28		
Carbon steels	1650	1040 - 1064	CK 60 - CK 101	060 A 40 - 060 A 96		XC 60 - XC 75
			36 Mn 5	070 M 55		40 M 5
	1880	1770 - 1880	Cm 45 - Cm 55	080 A 40 - 080 A 62	C 45 - C 60	XC 42 H 1
						XC 55 H 1
Alloy steel	2120	1335 - 1345		1717 CDS 110		25 CD 4
			25 Cr Mo 4 - 42 Cr Mo 4	708 A 37	25 Cr Mo 4 - 42 Cr Mo 4	
	2255	4130 - 4140		708 M 40		42 CD 4
Alloy steels	2541	4337 - 4340	40 Ni Cr Mo 6	735 A 50, 534 A 99	40 Ni Cr Mo 2 - 40 Ni Cr Mo 7	35 NCD 6
	2230	50100 - 52100	40 Ni Cr Mo 73	817 M 40	30 Ni Cr Mo 8 - 35 Ni Cr Mo 6 KB	50 CV 4
		6145 - 6152				
	2258	8630 - 8645	34 Cr Ni Mo 6, 100 Cr 6	311 tipo 6 e 7	50 Cr V 4, 100 Cr 6	100 C 6
Tool steels	2310 - 12	D - 2, D - 3	X 210 Cr 12	BD 2, BD 3	X 205 Cr 12 KU	Z 160 CVD 12
	2754 - 55		X 155 Cr V Mo 121		X 155 Cr V Mo 121 KU	Z 200 C 12
Tool steel	2550	S - 1	60 W Cr V 7	BS 1	55 W Cr V 8 Ku	55 NCVD 7
	2710		55 Ni Cr Mo V 6		55 Ni Cr Mo V 6	
Stainless steels	2324	201, 202	X 2 Cr Ni 189	304 S 15	X 2 Cr Ni 18.11	Z 2 CN 18.10
	2333	302, 304	X 5 Cr Ni 189	304 C 12	X 5 Cr Ni 18.10	Z 6 CN 18.09
			G - X 2 Cr Ni 189	304 S 12	G - X 2 Cr Ni 19.10	Z 3 CN 19.10
Stainless steel	2343	314, 316	X 15 Cr Ni Si 2520	316 S 16	X 16 Cr Ni Si 2520	Z 12 CNS 25.20
			X 5 Cr Ni Mo 1812		X 5 Cr Ni Mo 1713	
	2353	317	X 5 Cr Ni Mo 1713	317 S 16	X 5 Cr Ni Mo 1815	Z 6 CND 17.12

Troubleshooting

10

This chapter describes the inspection and troubleshooting procedures for the **TIGER 370 CNC–MR**. Regular inspections and efficient maintenance are essential to ensure your machine gives you a long, trouble–free service life. The chapter is divided into two sections: the first being dedicated specifically to TROUBLESHOOTING BLADE AND CUTTING PROBLEMS, while the second TROUBLESHOOTING section concerns troubleshooting general machine operating faults. Taken together they form a comprehensive trouble-shooting guide which will enable you to follow a methodical procedure for solving any problem.

Troubleshooting blade and cutting problems

PROBLEM	PROBABLE CAUSE	SOLUTION
Cuts not at 90 degrees or angled 	◗ Head speed too high	☞Reduce head speed
	◗ Disc with worn teeth	☞Replace disc
	◗ Perpendicularity of disc to work surface	☞If this is not the case, contact our technical service department
	◗ Cutting speed too low	☞Increase cutting speed.
	◗ Broken teeth	☞Check the hardness of the material being cut.
Teeth breaking 	◗ Incorrect lubricant/coolant fluid	☞Check the water and oil emulsion; check that the holes and hoses are not blocked; direct the nozzles correctly.
	◗ Material too hard	☞Check the cutting speed, feed speed and disc pressure parameters and the type of disc you are using.

PROBLEM	PROBABLE CAUSE	SOLUTION
Teeth breaking	◗ Disc not worn-in correctly	☞With a new disc it is necessary to start cutting at half feeding speed. After the wearing-in period (a cutting surface of about 300 cm2 for hard materials and about 1000 cm^2 for soft materials) the cutting and feed speeds can be brought up to normal values.
	◗ Disc with excessively fine tooth pitch	☞The swarf wedges into the bottom of the teeth causing excessive pressure on the teeth themselves.
	◗ New blade inserted in a partially completed cut.	☞The surface of the cut may have undergone local thermal alteration, making it harder: when starting work again, use a lower cutting speed and head feed speed. A tooth from the old blade may be left in the cut: check and remove before starting work again.
	◗ Workpiece not clamped firmly in place	☞Any movement of the workpiece during cutting can cause broken teeth: check the vice, jaws and clamping pressure.
	◗ Vibration	☞Workpiece vibrates in the vice: check that the slide has been adjusted correctly; check the clamping pressure and if necessary increase.
Rapid tooth wear	◗ Head speed too slow	☞The blade runs over the material without removing it: increase head speed.
	◗ Cutting pressure too high	☞Reduce cutting pressure.
	◗ Cutting speed too high	☞The teeth slide over the material without cutting it: reduce the cutting speed.
	◗ Insufficient coolant	☞Check the coolant level and clean piping and nozzles.
	◗ Incorrect fluid concentration	☞Check and use the correct concentration.

PROBLEM	PROBABLE CAUSE	SOLUTION
Rapid tooth wear	◗ Material defective	☞The materials may present altered zones either on the surface, such as oxides or sand, or in section, such as under-cooled inclusions. These zones, which are much harder than the blade, cause the teeth to break: discard or clean these materials.
Broken blade	◗ Head speed too high	☞Reduce head speed.
	◗ Teeth in contact with material before starting the cut	☞Always check the position of the blade before starting a new job.
	◗ Insufficient coolant	☞Check the coolant level and clean piping and nozzles.
	◗ Vibrations	☞Workpiece vibrates in the vice: check that the slide is regulated correctly; check the clamping pressure and if necessary increase.

Troubleshooting (control console diagnostics)

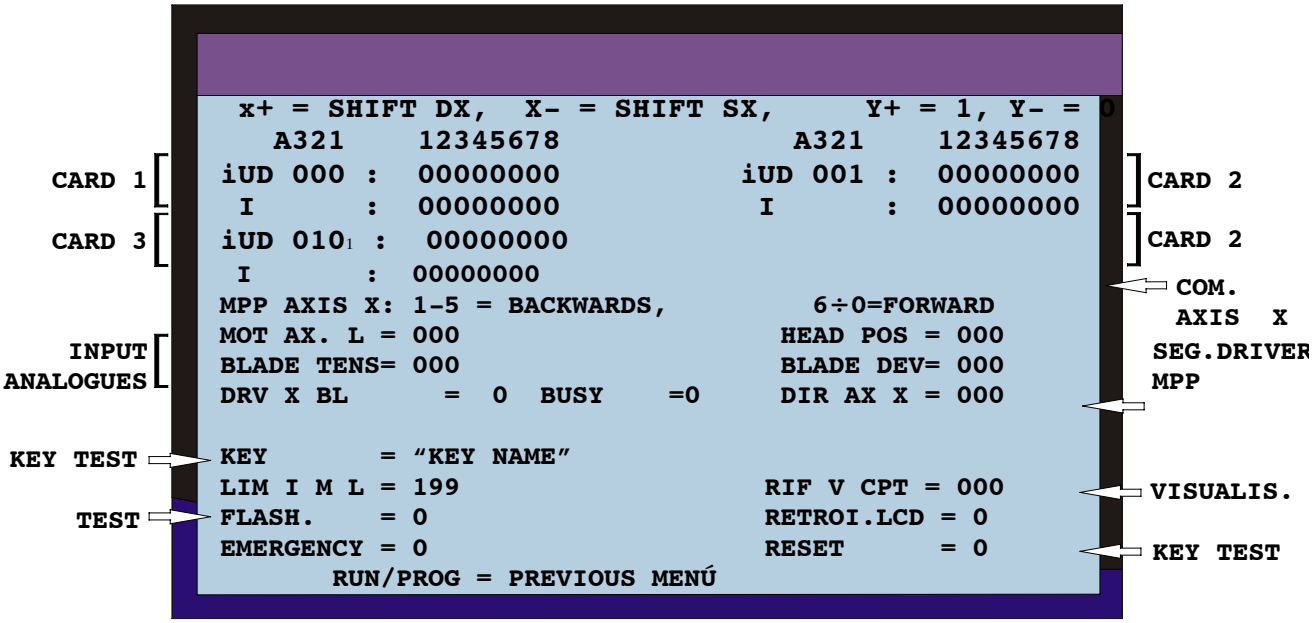
This section deals with problems which may occur during machine operation. The MEP 24 controller allows you to test all the machine electrical and electronic devices by checking the status of the input and output signals on the IUD/IUV card.

Displaying the diagnostics menu

- ▶ Power up the machine as per the instructions in Chapter 5;
- ▶ press F6 to access machine diagnostics;
- ▶ press RESET to enable the digital outputs.

N.B. Should access to the diagnostics menu prove impossible, then press F3 immediately after powering up the machine;

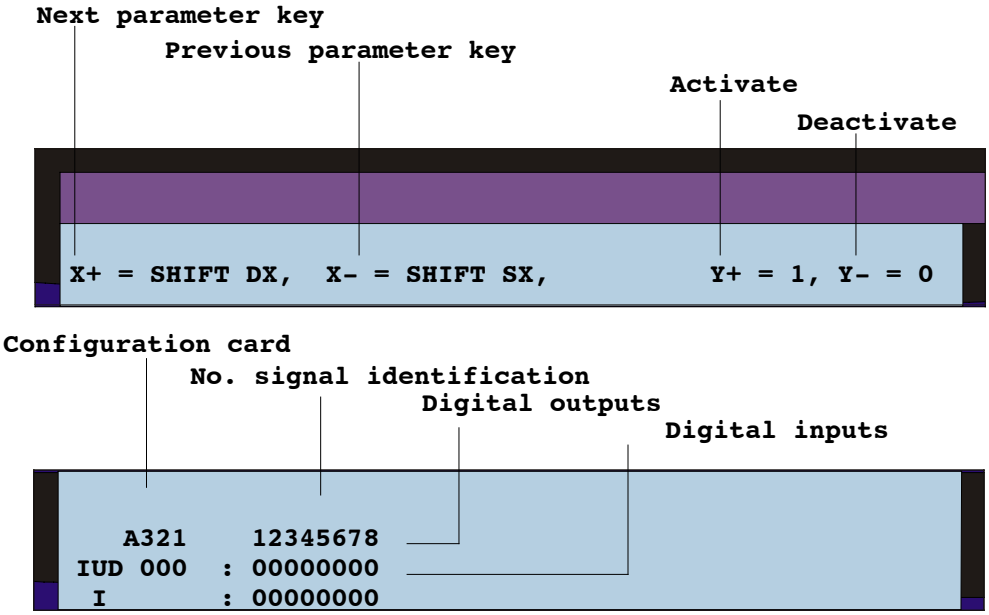
The diagram below shows the inputs and outputs, both digital and analog, of the machine:


x+ = SHIFT DX, X- = SHIFT SX, Y+ = 1, Y- =
A321 12345678 A321 12345678
iUD 000 : 00000000 iUD 001 : 00000000
I : 00000000 I : 00000000
iUD 010 : 00000000
I : 00000000
MPP AXIS X: 1-5 = BACKWARDS, 6÷0=FORWARD
MOT AX. L = 000 HEAD POS = 000
BLADE TENS= 000 BLADE DEV= 000
DRV X BL = 0 BUSY =0 DIR AX X = 000
KEY = "KEY NAME"
LIM I M L = 199 RIF V CPT = 000
FLASH. = 0 RETROI.LCD = 0
EMERGENCY = 0 RESET = 0
RUN/PROG = PREVIOUS MENÚ
CARD 1
CARD 3
INPUT ANALOGUES
KEY TEST
TEST
CARD 2
CARD 2
COM. AXIS X SEG.DRIVER MPP
VISUALIS.
KEY TEST

Diagnostics

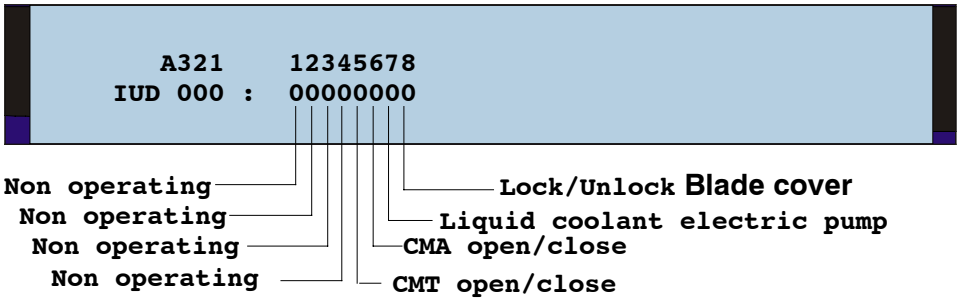
Once you have opened the diagnostics menu, a set of characters, each corresponding to INPUT and OUT PUT signals on the MEP 24 controller are displayed. For further information, refer to the electrical and electronic diagrams illustrated in chapter 6 of this manual.
The IUD–IUV card are mounted inside the MEP 24 controller.

Legend of navigation and reading keys



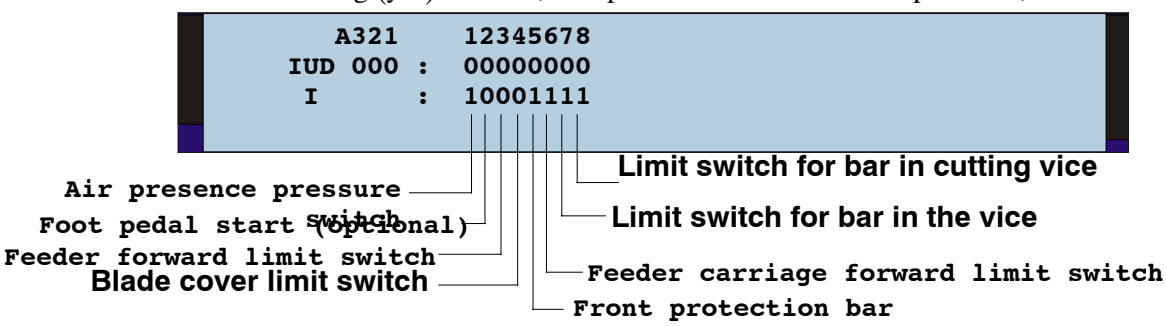
Digital outputs CARD IUD 1

Digits 0 and 1 on the top line of the display indicate the OFF (0) or ON (1) status of each output; press relative activation (y+) or deactivation keys (y–), to check functioning; but press Reset beforehand to enable output:



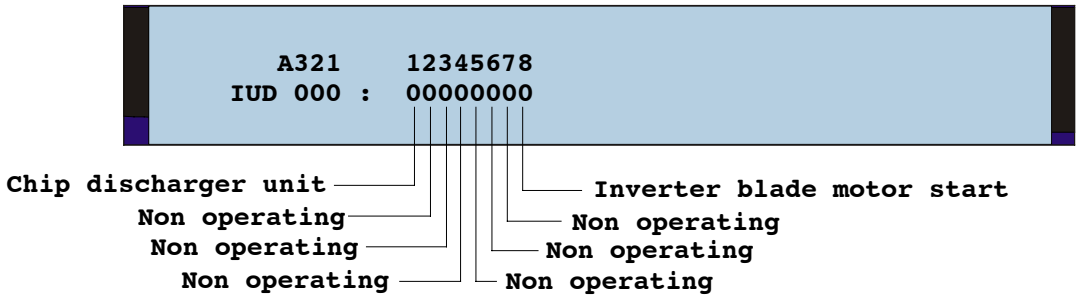
IUD card 1 digital inputs

The numbers 0 and 1 shown on the bottom line of the display, indicate whether the OFF (0) or ON (1) status of each input; pressing the relative activating (y+) or deactivating (y–) buttons, it is possible to check their operation;


A321 12345678
IUD 000 : 00000000
I : 10001111
Air presence pressure
Foot pedal start switch (optional)
Feeder forward limit switch
Blade cover limit switch
Limit switch for bar in cutting vice
Limit switch for bar in the vice
Feeder carriage forward limit switch
Front protection bar

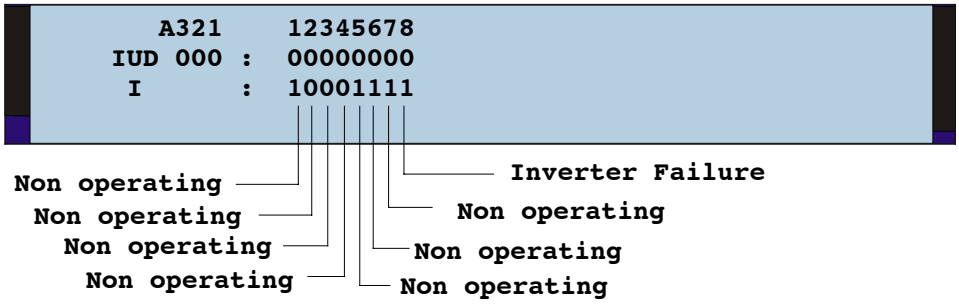
Digital outputs CARD IUD 2

Digits 0 and 1 on the top line of the display indicate the OFF (0) or ON (1) status of each output; press relative activation (y+) or deactivation keys (y−), to check functioning; but press Reset beforehand to enable output:



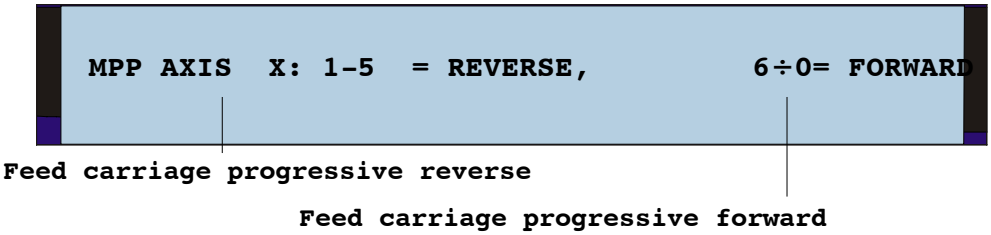
IUD card 2 digital inputs

The numbers 0 and 1 shown on the bottom line of the display, indicate whether the OFF (0) or ON (1) status of each input; pressing the relative activating (y+) or deactivating (y−) buttons, it is possible to check their operation;

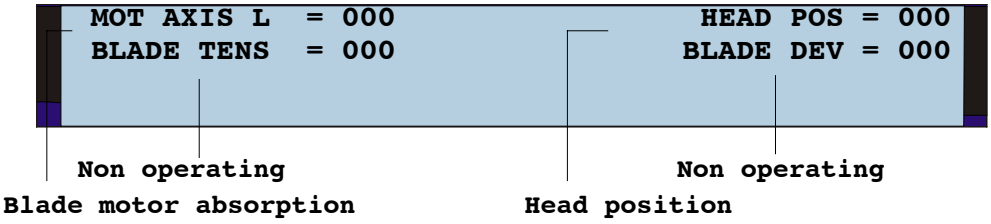


Input card IUV

Forward and reverse speed of the feed step motor can be controlled in the following way: digits 1 to 5 reverses the feed carriage at progressive speed, in the same way, digits 6 to 0 for forwarding;

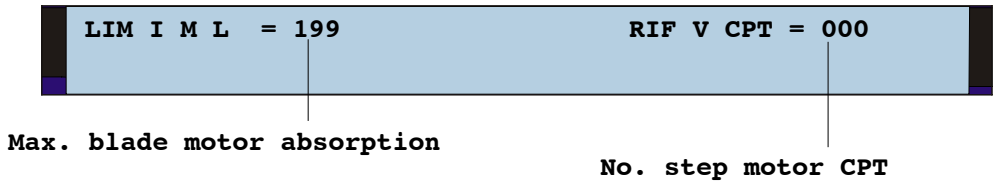


Blade motor absorption appears expressed in Ampers once blade inverter motor start has been activated in CARD no. 2. The head position visualises the cutting value transmitted by the cylinder head transducer which is between 1 and 255 and represents the current head height.



The blade motor maximum absorption visualises the cutting force value between 1 and 199 which is transmitted by the inverter by means of the potentiometer rotation on the control board.

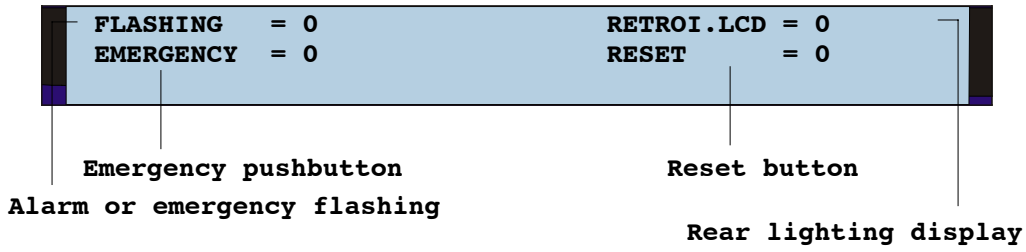
The vertical CPT (Head cylinder) visualises the value between 1 and 199 transmitted by the cylinder head step motor.



Input card CNSL (control console)

Each key on the console has a name which appears on the diagnostic menu after the sign "=", when pressed. For example, if we press key "start" to start up the cycle, alongside the sign "=" we see "START";
If, however, the name doesn't appear after the sign "=", it follows that malfunctioning is probably due to the key on the console which does not conduct electricity when turned off.

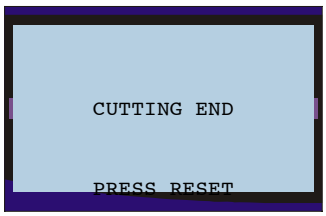
The values indicated in the following prospectus visualise activation or deactivation of the devices commanded by the CARD Console.



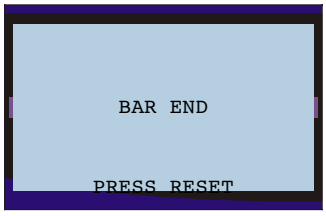
Error messages, alarm and emergency

The machine's MEP 24 controller notifies the operator of any alarm or emergency condition which may occur during production by way of acoustic and visual signals.

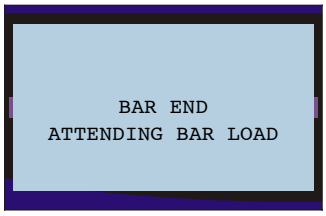
This message is displayed at each emergency initialisation.



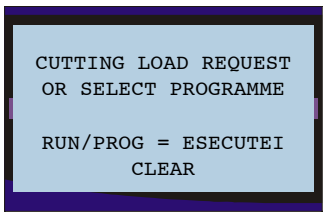
This message is displayed when the machine has carried out a full automatic cutting cycle. It advises the operator that the cycle is finished.
▶ Press RESET to restore manual command control.



This message is displayed when the bar load is terminated during normal, automatic cutting cycle.
▶ Press RESET to restore manual command control.

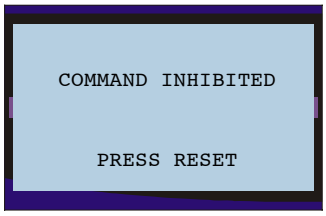


This message is when the bar load is terminated during normal, automatic cutting cycle. It advises the operator that the cycle is finished.
▶ Press RESET to restore manual command control. After inserting the new bar press START, the machine will register the material and continue the programme from where it was interrupted.

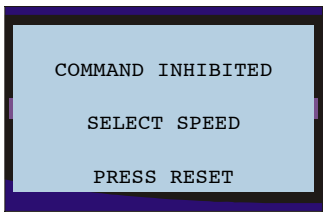


This message is displayed when an automatic cycle has been started without selecting the programme or setting the programme number.
▶ Press RUN/PROG once the number of cuts has been set or the programme selected to return to automatic cycle display.
▶ Press CLEAR to cancel data.

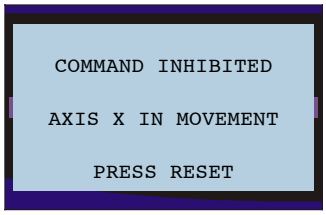
This message is displayed when tool reaches its duration in hours which is pre–set in the submenu (F8 = blade thickness) of the automatic cycle, the maximum limit is 9999 min
▶ Press RESET to return to manual command control.



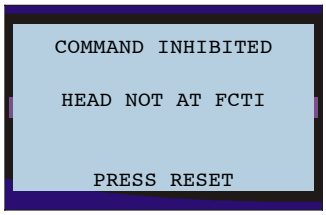
This alarm indicates a conflicting machine setting.
▶ Press RESET to return to manual command control.



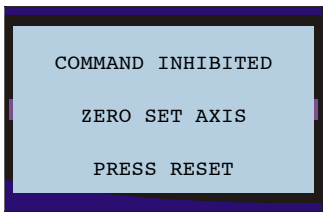
This message is displayed if the cycle has been started without having selected the cutting speed or the inverter range. Select speed.
▶ Press RESET to return to manual comand control.



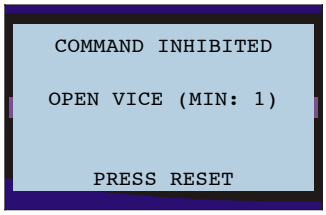
This message is displayed when a further command is given to the carriage feed.
▶ Press RESET, operation will follow and appear on the display.



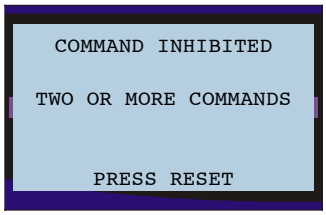
This message is displayed when a START cycle command is given and the head is not at FCTI position.
▶ Press RESET, to return to manual command control.



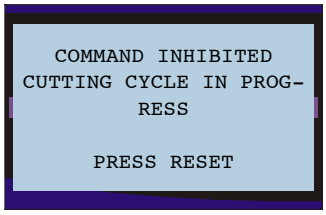
This message may appear if the ZERO SETTING cycle has been skipped because machine was initially intended for semi–automatic cycle.
▶ Press RESET to return to work display then proceed to “ZERO SETTING”



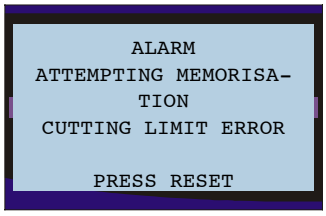
This message is displayed when trying to move feed with manual buttons and both vices were previously closed.
▶ Press RESET, to return to manual command control.



This message is displayed when “PLAYING” with the keyboard i.e. when a command has been given and keys continue to be pressed.
▶ Press RESET, to return to manual command control



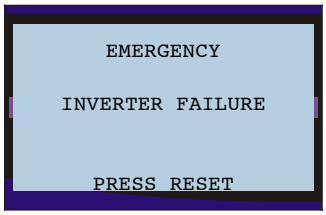
This message may appear when cutting cycle has been started and the machine has been requested to carry out other operations.
▶ Press RESET, to return to work displpay.



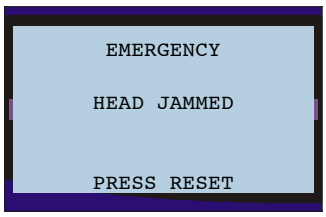
This message is displayed when the cutting limit has been changed. New cutting start position could be lower than previous position saved for cutting end position.
▶ Save FCTI and FCTA positions again and press RESET to return to manual command control.

This message is displayed if an operation is activated before releasing the HEAD EMERGENCY STOP button.
▶ Release the emergency stop button and press RESET to return to manual command control.

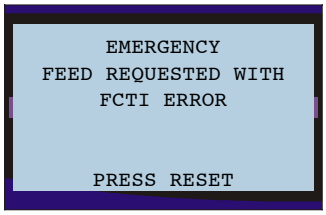
The causes of this problem could be of mechanical, electrical or electronic nature.
▶ Press RESET to return to manual command control



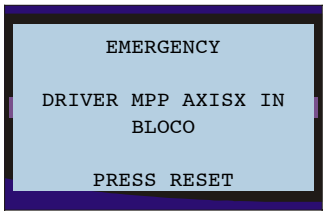
This message is always on line when the system is in use.
▶ Press RESET, to restore manual command control.



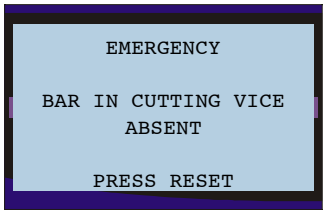
This message is always on line when the system is in use.
▶ Press RESET, to restore manual command control.



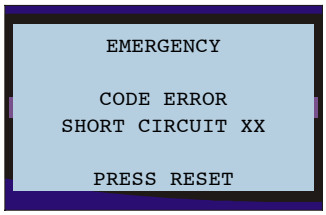
This message may appear during automatic cycle when the head returns to FCTI position and then loses its positioning.
▶ Press RESET to restore manual command control.



This messages derives from an anomaly in AXIS X control and may be due to overheating or electronic breakdown.
▶ Press RESET to restore manual command control.



This message is displayed when no material has been loaded in the cutting vice or when the cutting vice hasn't been manually positioned at a distance of 2÷3 mm before being automatically closed
▶ Press RESET to restore manual command control.

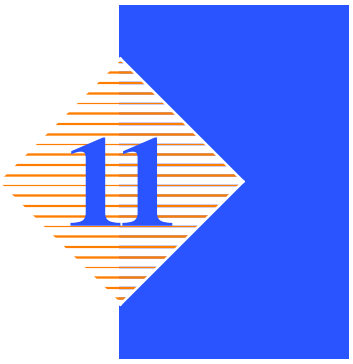


This message is displayed each time the controller software transmits an error, it is identified as (XX). Here follows a list of error codes which may occur during working.

0 = INCORRECT RESET OR INTERRUPTS
1 = DIGITAL INPUTS CARD 3 UNSTABLE
2 = DIGITAL INPUTS CARD 4 UNSTABLE
3 = NO STATUS OR SCREEN
4 = DIGITAL INPUTS CARD 1 UNSTABLE
5 = DIGITAL INPUTS CARD 2 UNSTABLE
6 = ANALOGUE INPUT BLADE TENSION (#9) UNSTABLE
7 = INP. ANALOGIC AXIS BLADE MOTOR (#3,4) UNSTABLE
8 = INP.ANALOGIC POWER TABLE CENTRE HEAD (#6) UNSTAB.
9 = OUTS 1st AND 2nd OUTS REQUEST SPEED. SIMULT.
10 = REQ. OUTS 1st AND CEN. STAR 2nd SPEED. SIMULT.
11 = REQ. OUTS 1st, CEN. STAR AND 2nd SPEED. SIMULT.
12 = EEPROM UNAVAILABLE
13 = IUV FAILURE
14 = TEST RAM FAILED
15 = TEST ROM FAILED
16 = UNDEFINED EMERGENCY
17 = NO CUTTING CYCLE PHASE
18 = INP.ANALOGIC POWER TABLE CENTRE. HEAD (#6) UNSTAB.

▶ Press RESET to restore manual command control

Optional



This chapter provides a list of the available accessories that can be fitted to this machine, along with assembly instructions.

Accessories available on request

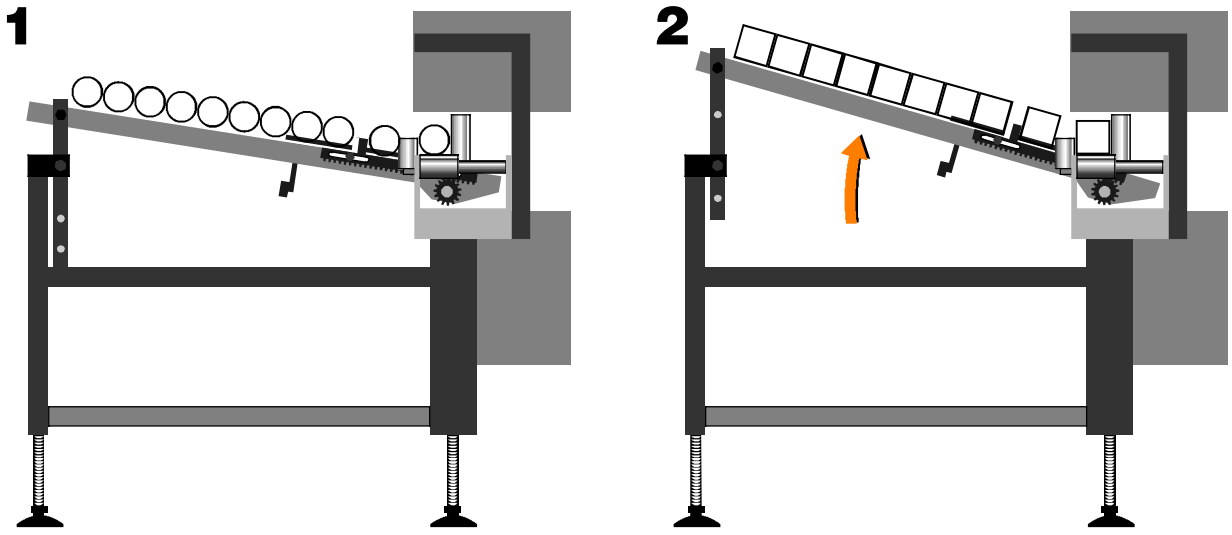
These optional extras must be fitted in the manufacturer's factory, inasmuch as they could be difficult for the user to mount by himself. A list of these parts is provided below.

Chute type bar loader CB 6001

This accessory delivers all the bars on the loader chute in order, giving long autonomy to the saw even when unattended.

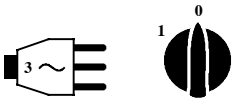
N.B. CB 6001 must be ordered with the saw, as it is necessary to enhance the controller and to test it carefully before delivery.

It has a surface of 80 cm with adjustable tilt feature, can be loaded entirely with circular bars (1) or square bars (2), solid or tubular, in the dimensions indicated in the table below:



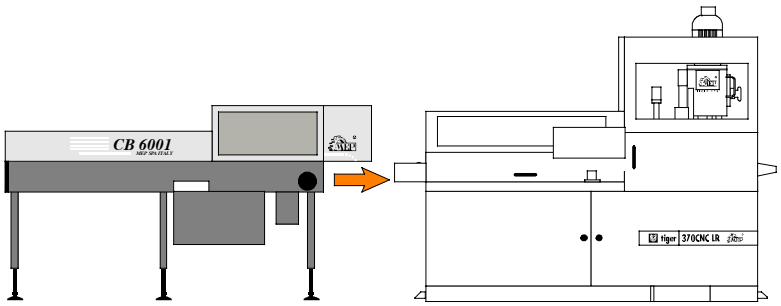
LOAD TABLE						
Sections	●	○	■	□	▬	▭
mm	20÷80	20÷100	20÷80	20÷100	130 x h 10÷35	130 x h 10÷100

It must be connected to a 6 Bar pneumatic power supply and the motor is fed by the saw control.

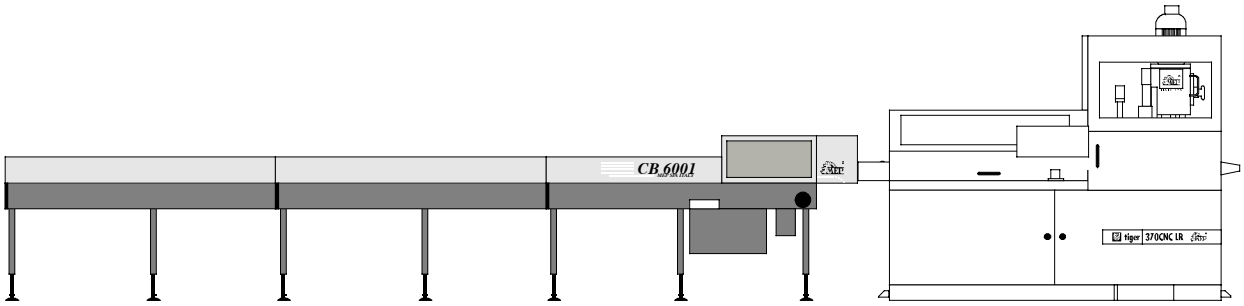
CHARACTERISTICS		
		
BAR	**kw**	**kg**
6	0.37	485

Installation:

- fit the adaptor, which is together with the motor unit, on the loading side of the machine;
- position the motor unit on the loading side (left) and connect it to the machine adaptor;



- before tightening the screws, use a ground bar and place the first module level with the working surface, adjusting the feet;
- fit the other two modules, by inserting the male tubes into the female ones;



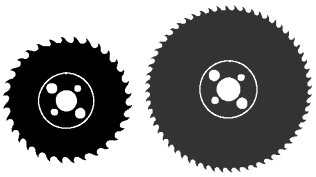
- open the rollers that determine the load section entirely; then insert the drive connection coupling in the crown gear of modules 1 and 2, then of modules 2 and 3;
- fix the modules using screws and bolts in the tube holes;
- unwind the emergency winding, located on the first module, until the device reaches the last module; fix it using screws in an easily accessible place;
- take the emergency mushroom, located on the first module, to the end of the last module which is set for fixing and connecting the cables;
- insert the power supply plug into the socket on the left–hand side of the machine;
- connect the male terminals of the signal cables to the controller card, making them pass through the hole in the electric cabinet with sheath and fitting, then connect the male terminals with the female terminals inside the cabinet.

Optional

Blade

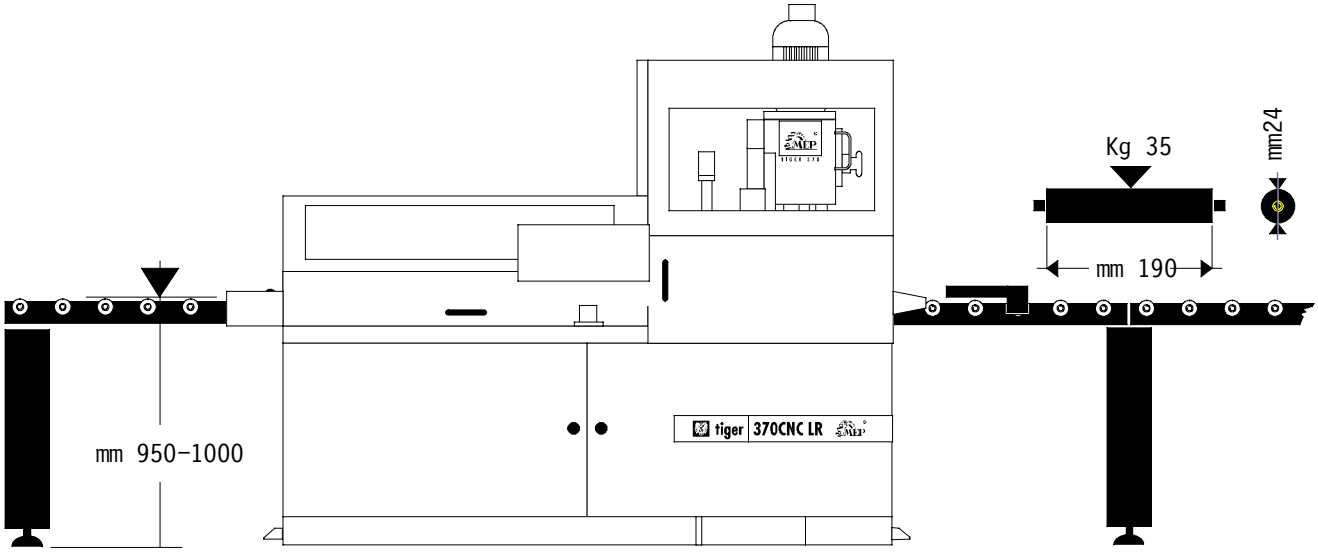
The disk for the **TIGER 370 CNC–MR** is:

- circular blade HSS DMo5/M2 D.370x32x3.



Roller table

- K35 roller table module for feed side, 1500 mm;



- K35 roller table module for discharge side, 1500 mm.

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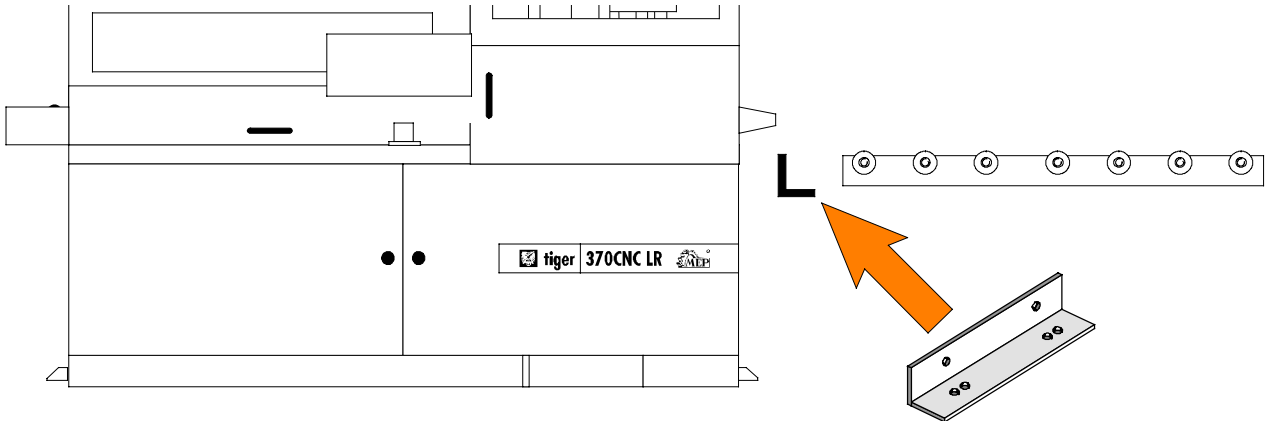
This device is used to attach the discharge roller table to the machine, and instructions are supplied below for how to assemble it:

▶ remove the chute from the right–hand side of the fixed platform;

▶ attach the adapter and secure it in place with the screws removed previously.

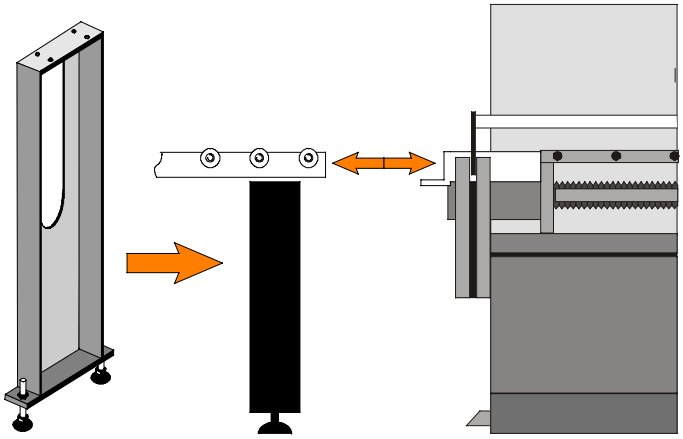


▶ Attach the outfeed rolling deck by fixing it with the screws supplied.

Feed side roller table support

This device is used to increase the load–bearing strength of the roller table, both during feeding and discharge. The steps which should be followed to assemble it are illustrated below.

▶ Disconnect the table from the adapter (on the discharge side, for example);

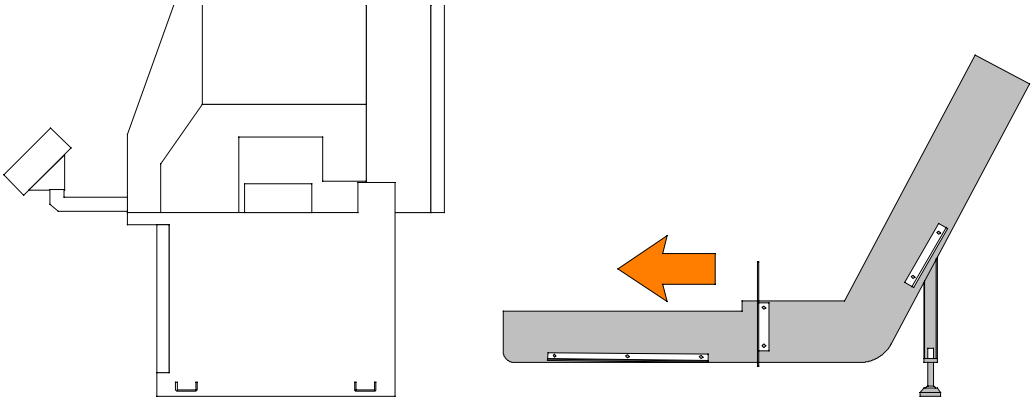


▶ position the support to correspond with the holes on the base of the trailer and reconnect to the adapter.

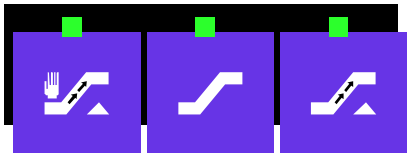
Motor chip discharger unit

This device can be used to eliminate the chips from the chip collection drawer; for installation, proceed as follows:

▶ disconnect the machine from the power supply;
▶ extract and remove the chip collection drawer;



▶ fit the lower part of the discharger unit in the place of the drawer, making the holes coincide for the screws;
▶ adjust the discharger unit feet so that the conveyor belt is slightly tilted;
▶ connect the machine to the power supply again;
▶ start the machine and select the operating mode on the control panel; from left to right in order: manual, inactive, automatic.



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